A Perceptual Approach to the Description and Analysis of Acousmatic Music

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Declaration

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Abstract

This thesis investigates the problems of describing and analysing music that is composed for, and presented from, a fixed medium, and diffused over loudspeakers with minimal intervention, especially where such music resembles everyday sounds as much as it does traditional musical material. It is argued that most existing theories of *acousmatic music* are closely tied to prescriptive rather than descriptive concerns, and concentrate upon intrinsic aspects of acousmatic music to the detriment of its extrinsic potential. In contrast to such approaches a method of description based upon an ecological theory of listening which accounts for the relationship between structured information and the perception of events is proposed. This descriptive approach is used as the basis for analysing acousmatic pieces, revealing a complex interpretative relationship between listener, piece and environment. Such an approach, it is argued, accounts for those aspects of acousmatic music excluded by most current approaches, but more importantly provides a theoretical framework within which descriptions may be arrived at which avoid the prescriptive bias of exisiting theories. The perspective provided by this analytical approach is reinterpreted through a critical approach to aesthetics, showing how acousmatic music can be seen as both autonomous and mimetic and how the dialectic between these two aspects is potentially critical of our relationship with the world. The relationship between musical techniques, materials and technology is discussed in response to this perspective showing how acousmatic music might be regarded as part of a broader aesthetic context. In conclusion, it is argued that acousmatic music does not merely challenge the view that music is primarily self-referential, but also that it reaffirms the possibility that music may be both intrinsically and extrinsically significant.

Summary

This thesis is divided into four chapters. **Chapter 1** offers a critique of existing theories which purport to form the basis for the description of acousmatic music. It is concluded that there is a need for a descriptive, perceptual theory of acousmatic music, a theory which is able to respond not only to the intrinsic structures concentrated on by traditional notation and music theory but also to the extrinsic structures within which acousmatic works are situated.

Chapter 2 presents a review of work in ecological acoustics which, it is argued, provides a theoretical framework within which the relationship between the work and its surroundings might be explored. This framework is extended to apply to the perception of cultural, social and aesthetic aspects of these surroundings, and a preliminary musical analysis is offered which applies this theoretical approach.

Chapter 3 develops and extends the theoretical position developed in Chapter 2 through a detailed analysis of *Mi Bémol* by Yves Daoust. A number of shorter analyses are also provided to further illustrate the application of theory to analytical practice.

Chapter 4 forms both a conclusion to the preceding chapters and a cultural critique of the theoretical position they develop. A number of observations are drawn regarding acousmatic music's position within contemporary culture and some general conclusions are reached regarding the relationships between composition and listening, and between perceptual and musical research.

Chapter 1

Towards a perceptual theory of acousmatic music

1.0 Introduction

Consider a form of music which is presented through loudspeakers to an audience from an analog or digital tape-recording. This music may contain sounds that have recognisably musical sources, but may equally present recognisable sources that are beyond the bounds of traditional vocal and instrumental technology. We are as likely to hear the sounds of a bird, or of a factory as we are the sounds of a violin. Consider also that the technology involved transcends the mere reproduction of sounds. Techniques of synthesis and sound processing are employed which may present us with sounds that are unfamiliar and that may defy clear source attribution. Consider that this form of music may present us with familiar musical events: chords, melodies and rhythms which are easily reconcilable with other forms of music, but may equally present us with events which cannot be classified within such a traditional taxonomy.

This thesis considers such a music, and will attempt to reconcile such departures from familiar frames of musical reference with the frame of reference provided by our everyday experiences. As such it will concentrate not upon those events which conform to our musical expectations, but those that challenge them. In doing so an attempt will be made to make sense of such a music, not in terms of our musical perceptions, but in terms of perception as a whole. Although much of the music considered might be explored from a traditional standpoint, through the existing tools of musical research, it is where these tools seem inadequate that this thesis will focus. It is not proposed that such a music cannot be viewed from existing

perspectives, rather that it is more revealing to approach it afresh. Taking such an approach will not only be shown to be appropriate to the music at hand, despite its exclusion of traditional models, but will also be shown to provide a theoretical standpoint that may be turned back upon music as a whole. Hence, no apology is made for limiting the musical examples to the more extreme instances of this music. The rationale is not to conceal examples which may be assessed in more conventional terms, but to stress those examples which defy such methods. This thesis is concerned with music, above all, and as will be demonstrated, the very nature of music is at issue here.

1.1 Perceptual descriptions, pedagogy and critique

1.1.0 Describing acousmatic music

This thesis will attempt to show that a fuller understanding of *acousmatic music*[1] can only be achieved through situating the genre within a wider perceptual context. This context must reflect social and ideological issues, but must also be grounded within a broad view of auditory perception. Rather than assuming that acousmatic music can be understood from the perspective of conventional music theory, or from existing theories of musical perception, this thesis will work upwards, so to speak, from the most general and primary aspects of auditory perception towards social, aesthetic and cultural issues. The reasoning behind this grounding in 'everyday' perception, rather than in specialised 'musical' forms of perception, will be dealt with in this and the following chapter. In this chapter, the need for a descriptive and perceptual

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[1] The term acousmatic music is here partly interchangeable with the term *musique concrète* as originally intended by Schaeffer and reiterated by Michel Chion (1993). Acousmatic music is music that is recorded and then diffused without combination with live electronics or live performers; it exists only on tape (whether analog or digital) or as a fixed set of instructions to a computer. The term *acousmatic* is preferred to *concrète* as it emphasises the way in which the 'real' acoustic source is assumed to be hidden from the audience. Acousmatic music does not exclude the use of synthesis or sound processing; but these processes must be employed in the making of a fixed artefact that is then diffused, rather than employed during performance.

theory of acousmatic music will be assessed and a number of methodological problems identified that have been largely ignored or sidelined by existing approaches. These problems will be discussed and a working hypothesis for describing acousmatic music will be advanced. In the following chapter, an approach to perception will be investigated which seems to provide a broad perceptual framework within which to situate the perception of acousmatic sounds in accordance with this working hypothesis.

Although pedagogical concerns will be addressed in the first of these sub-sections, it should be stressed that the theory is not intended to be *prescriptive*. The aim here is not to constrain the methods used in composition or performance of acousmatic music, but to show that a descriptive theory of the kind offered in this thesis offers a basis for communication between the compositional community, the teaching community, music theorists, perceptual theorists, cultural theorists and listeners.

Inevitably, any descriptive theory may affect compositional practice; methods of analysis can always be applied in reverse, so to speak, as methods of composition. Moreover, any attempt to offer an alternative description of musical practice may subtly alter that practice, regardless of whether practitioners are conscious of such changes. Merely describing acousmatic sounds or pieces in an alternative fashion may alter their usage. However, unlike Schaeffer's *prescriptive* theory (1966; also see Chion, 1983) which deliberately attempts to constrain and motivate particular compositional techniques according to a particular method of description, a *purely* descriptive theory will address different concerns. Rather than providing a blueprint for producing new pieces of music, such a theory must concern itself with how to produce better *descriptions* of existing music. Moreover, such descriptions, although they may lead to a *critique* of existing practice, will not provide any recommended method for translating such criticism into compositional activity.

1.1.1 Pedagogy

Ways of describing sounds for musical usage are important to the musician. If one is to practise or teach composition one must have a language for verbalising the techniques and resulting perceptual effects of electroacoustics. As Keane (1986) notes:

> "The most important tool for establishing an aesthetic of electroacoustic music is *language*. We must have words to express and explain what we do as much as we must engage in doing."
>
> (Keane, 1986, p. 118)

One can only communicate so much by example; eventually one wishes to explain why something is wrong, why this sound behaves as it does, and so on. Although Keane demands "language" in order to establish an aesthetic, his views strongly reflect upon the communication of musical practice between composers and between composer and student. This use of the term "language" is rather different from that of Schaeffer (1966), for whom a musical language is presupposed: musical structure is seen as being similar to linguistic structure and the concern is to define a "language of electroacoustic music" (see Emmerson, 1986). This concern with the structural similarities between music and natural language, and the belief that such similarities are a priori and self-evident, mirrors the linguistic approaches to traditional music taken for example by Lerdahl and Jackendoff (1983) and should be treated with scepticism (see Clarke, 1989).

In this case, Keane (1986) argues that "language" is important as a descriptive tool in a communicational sense; a method of communicating musical practice. This is of considerable importance for the teaching of acousmatic music. Although teaching by example is often regarded as the most successful method of passing on a practical skill, some form of language is necessary for clarifying and justifying a particular compositional decision in a pedagogical setting. Here, the particular language in which such descriptions are expressed is not seen as critical, but the point to be noted is that some form

of descriptive language is required, and that the basis upon which such descriptions are made is a primary concern.

This thesis will attempt to base such descriptions upon the *perception* of acousmatic music. It has been argued that acousmatic music seems to demand an attention to listening that is unequalled in contemporary musical composition (e.g. Schaeffer, 1966; Delalande, 1986; Smalley, 1986). The conventional composer may draw upon traditions of orchestration, harmony and counterpoint and the like, which allow him or her to predict how a particular configuration of musical events will behave without having to listen to the aural result. Moreover, the use of an accepted notation allows the process of composition to become as much a literate as an aural practice. Such traditions enable composers to discuss their methods within an existing descriptive language which is both widely accepted and linked to a conventional notated form. Listening is obviously important to composers of all kinds of music, but may be supplemented by a pre-existing terminology and method of notation where these exist. Despite the efforts of Schaeffer (1966), whose painstaking *solfège* of classificatory terms for electroacoustic sounds, and the theoretical writings of such as Smalley (1986; 1992) and Wishart (1985; 1986), both of whom offer descriptive discourses, the acousmatic composer cannot fall back upon a body of tradition in the same way as an instrumental or vocal composer. The potentially infinite aural results of analog and digital synthesis and manipulation of sound have no accepted predictive theory or notation. Although the resulting reliance upon the ear as the final arbiter of compositional decisions may be laudable as a corrective tendency for the overly literate methodology of a technique such as integral serialism (see Chion, 1983, p. 40) this reliance makes the communication of musical ideas very much a matter of illustration by example. This perhaps explains in part the tendency of electroacoustic composers to cluster around small, specialist research institutes and academic

departments[2] where musical ideas can be reliably transmitted through a largely oral (and aural) culture. Schaeffer's treatise (1966) is a notable exception to this model, though it remains part of such a compositional subculture: it is yet to be translated from French into any other language and its approach reflects the isolated philosophy of a particular institution's practical research— the *Groupe de Recherches Musicales*. Its polemical rejection of both notation and the more narrative aspects of sound offer a specialised and hence limited approach to describing, or more accurately, *prescribing* acousmatic music.

By contrast, the proposal of this thesis is that the radically aural nature of acousmatic music may only be retained within a descriptive model that is based upon research in perception. If a level of auditory perception can be identified that provides a grounding for describing relevant attributes of electroacoustic sounds, both in isolation and combination, then the resulting descriptions might offer a relatively neutral method of discussing compositions and compositional practice quite unlike the highly personal discourses presently available (e.g. Schaeffer, 1966; Wishart, 1985; 1986; Smalley, 1986; 1992). Attention to perception affords us some knowledge of which attributes of sound may be perceived by the listener; and as an aural practice, acousmatic composition is as much about listening as it is about abstract technical manipulations of sound. Hence, by studying perception one might arrive at descriptions that correspond to *what* is heard by the composer, and hence, provide a method of describing *why* particular sounds lead to particular compositional decisions. Moreover, if such perceptually motivated descriptions are based upon general properties of human auditory perception

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[2] One must note that the technological demands of electroacoustic composition also motivate such geographical clustering. The sheer expense of such technology often demands shared usage and state or charitable funding on a scale that severely limits the isolated composer's access to the required facilities. However, this is not a sufficient condition for such a notable reliance upon institutional support. Many composers can afford their own equipment, aided by the burgeoning usage of digital technology in popular music and the related availability and affordability of such usable (if not always ideal) technology.

they may avoid the tendency towards over-specialised and private languages of description that obscure and mystify practice rather than providing a broad basis for communication.

1.1.2 Critique

Just as finding appropriate perceptual descriptions of acousmatic music may inform pedagogical practice, such descriptions may foster critical practice. It is extremely difficult to form a critical discourse without first defining the objects of study. Likewise, the choice of descriptive methodology to a large extent defines the relevance of a critique. The objections introduced above, with regard to the problems of communicating about acousmatic music from within the framework provided by composers themselves, are equally pertinent here. There is a danger that a critique based upon the assumptions of practitioners will merely reflect the concerns of those practitioners and ignore the differences between compositional and listening praxes. A perceptual description which is grounded outside of compositional concerns, yet is applicable to such concerns in its generality of reference, in which the perceptions of both composers and listeners form different, yet commensurable domains, is vital here. Through such descriptions there comes the possibility of a critique of acousmatic music that transcends the limitations of descriptions generated by compositional inquiry. Just as broadly-grounded perceptual descriptions may benefit pedagogy, so they may also provide the basis for a critique which reflects more than the concerns of composers. Without such descriptions, aesthetic discourse remains bounded within the particular concerns of compositional praxis.

1.2 Notation and theory: analytical problems

1.2.0 Analysis of acousmatic music

Keane's concern with descriptive language (1986) reflects a central problem in the analysis of acousmatic music. Despite the adoption of some aspects of traditional musical practice within acousmatic music, such as serial or neo-tonal pitch orderings, conventional rhythmic structures and the imitation of instrumental timbres, the genre does not require that such traditional skills be applied. Acousmatic music has certain fundamental differences from other forms of music, differences that pose unusual analytical problems. These problems must be addressed if we are to describe acousmatic music in its own terms, rather than in terms of other musical traditions.

The three major differences between acousmatic music and traditional western art music that will be addressed here are those of notation, theory and material. The first two of these have been touched upon above in relation to communication and critique and will be discussed in detail in sections 1.2.1 and 1.2.2. The changes in materials employed by acousmatic composers will be discussed both with reference to notation and theory within these two sections, and in more philosophical terms in section 1.3. These differences can be shown to pose a considerable challenge to the music analyst. Moreover, the analytical discourse that this thesis will develop to cope with this challenge itself challenges conventional views of musical structure, musical meaning and aesthetics. Here, these challenges will be introduced and examined in relation to a number of existing approaches to analysis and notation.

1.2.1 Notation and acousmatic music

Notation serves two broad purposes in traditional western art music. It may *prescribe* the actions of performers, acting as a set of more or less strict constraints upon performance variables. In conjunction with the more general

constraints provided by a performer's particular musical background and the stylistic or interpretative constraints of a particular tradition of performance practice, notation provides a medium through which a composer may attempt to determine what is to be played, when, and in what manner. As such, a score in staff notation, for example, is a *message*, with a sender (the composer) and an addressee (the performer(s)). Within this communicational, or *pragmatic* interpretation (see Eco, 1979, p. 53) one is encouraged to view the score as a coded message which represents the intentions of the composer in a clear and unambiguous fashion whilst avoiding speculative interpretations of documentary evidence. The score represents a set of instructions that can be correctly or incorrectly interpreted by the performer, and can be said to *describe* those aspects of the music that the composer requires from the performers.

However, scores are regarded as descriptive in a much stronger sense than this. It is possible to analyse a musical score as if it were a representation of the piece itself. Staff notation provides the music analyst with a ready made, visual parsing of what one might hear when the piece is performed. Pitch is represented in discrete semitone steps, temporal structure in terms of a strictly multiplicative hierarchy of pulses; and articulation marks, orchestration instructions and miscellaneous directions combine to provide the analyst with a clear description of the piece. Moreover, notation provides a means for describing the results of analysis itself; Schenkerian analysis manages to describe analytical results in an extended version of the notation used in a score; a description of a description. Of course, as Nattiez stresses (1990), the score is but one source of information about a piece of music; acoustic analysis, psychological data, historical documents, the discourse of performers, listeners and composers all provide the analyst with different descriptions of the piece. However, the tendency to view the score as a privileged and verifiable objective source of information about the piece

remains. There seems to be a strong and implicit link between the prescriptive and descriptive roles of the score in musicology and music analysis. For example, Nattiez' tripartition of musical discourse (Nattiez, 1990) regards the score not only as a document of poietic relevance, but as a representation that in some sense provides the data for a *neutral* level of discourse[3]. The score, due to its prescriptive intention, provides a trace of pertinent musical structures; for example we are asked to assume that because the division of pitch into discrete steps is necessary from a prescriptive standpoint it must be relevant to a neutral pitch analysis. The score is seen to carry the trace of a particular culture's musical concerns (Nattiez, 1990). Hence, we may perform a structural analysis on the score and claim some form of neutrality, however specious this may be.

One begins to suspect that the seemingly post-structuralist concern with obliterating the concept of "communication" between sender and addressee is but a ruse. Assuming the neutrality of the score simply restates the role of score as "message" in different terminology. The reliance upon the score in Nattiez' writings and analyses (e.g. Nattiez, 1982; 1990) even strengthens this reification by proposing that the score is a message that can be positivistically decoded to form a neutral structural description, a *niveau neutre*. Eco's treatise on the theory of codes (Eco, 1979, pp. 48-150) helps to disentangle this obfuscation: within his perspective the score would be a set of expression units which are produced and interpreted according to culturally convened systems of syntax and semantics (see also Saussure, 1983, for a similar formulation in terms of signifier and signified). These systems of agreement (syntactic and semantic) endow a code with its function allowing expression units to become units of content; without such systems a code

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[3] The terms poietic, neutral and esthesic are here and elsewhere used in the sense proposed by Nattiez (1990): loosely speaking, poiesis refers to the production of the piece, esthesis to its reception. The neutral level of a piece is that which may be analysed independently from the concerns of production or reception: Nattiez argues that the score provides such a neutral object for prescriptively notated art music.

could not operate at all. Moreover, they entail a degree of freedom. When a performer interprets a score he or she does not simply decode that score according to a fixed set of rules; otherwise all performances of a given score would be identical. Instead the performer *interprets* the score, often producing unforeseen results.

In a rather different way, the study of performance expression in music psychology denies the reification of the score as a complete descriptive document in its insistence that the performance does not reproduce the indications in the score and that these differences are not merely due to inaccuracy but are strongly related to the structure of the music (see e.g. Clarke, 1988). To reify the score as the only basis for a neutral analysis is just as much a perversion of a poietic factor as the reification of a single performer's interpretation would be. The score is too underspecified a document, the single performance too overspecified.

Such an entanglement of the descriptive and prescriptive roles of the score in music analysis leads to even more confusion when acousmatic music is approached. The study of acousmatic music shows the absurdity of the explicit or implicit reification of notation in western music theory. The links between description and prescription, tenuous enough for staff-notated music, disintegrate here. Strangely, this disintegration seems to have been ignored by most theorists dealing with acousmatic music, as will be shown in a series of examples. Moreover, such a disintegration will be shown to highlight both the reification of the score as an analytical object and to demand alternative analytical techniques that may be relevant not only to acousmatic music but also to other music, whether notated or not. First, however, this disintegration should be examined in depth.

As already noted above (see section 1.1.1, above) acousmatic music has often been regarded as an aural practice. Delalande (1986, p. 158) notes that such non-literate practices "sont réalisées pour l'écoute et par l'écoute".

Notation does have a variety of roles within acousmatic music, but due to the reduced or absent prescriptive score within the tradition, a rather different relationship between prescriptive and descriptive scores is made plain. Although scores for acousmatic pieces exist in a variety of forms there is no form of notation, either prescriptive or descriptive, that approaches the ubiquity and acceptance of staff notation. In order to explain why this should be so it is necessary to examine the various kinds of prescriptive and descriptive scores that have been employed within the genre.

Unlike traditional instrumental or vocal music the electroacoustic composer is most often required to provide instructions for a machine rather than a human interpreter. Even outside the practice of computer music it is possible to regard an analog or digital recording as a form of code, to be decoded by a tape machine. Although such 'scores' may contain an element of indeterminacy this kind of 'score' is quite different from the culturally convened and underspecified code that a human performer is required to interpret. As discussed above, a human performer interprets a score, adding timbral, temporal and pitch inflections that reflect a cultural system of agreements between the expression units of a score and their content as determinants of a performance. The digital or analog code read by a computer or tape machine does not allow for this arbitrary relationship between expression and content; the relationship between code and performance is fixed according to a specific and inflexible standard. Moreover, such a code is not usually transparent to a human observer, designed, as it is, to be read by a machine. Such prescriptive scores are hence to be distinguished from staff notation in two major ways: they do not allow for a high degree of interpretation, and they are not designed to be read by humans. Obviously some programming languages (such as LISP) *are* more readable by humans, but in general such languages are primarily an interface between human and machine, not between human and human. In the case of digital and analog

representations of sound, the gap between these and staff notated scores is huge; they bear the same resemblance to the music that the grooves of a gramophone record do to the sound produced by a needle in the groove.

Other, more familiar prescriptive forms of notation are utilised in the electroacoustic field. Diffusion scores, which act as an *aide memoire* for the sound projectionist, and scores which attempt to synchronise traditional instrumental and vocal performance with a computer-generated or recorded piece, are much closer to the role played by staff notation. Such scores are intended for human interpretation and hence must represent aspects of the music that are perceptually and pragmatically relevant. However, no accepted cultural conventions exist to delimit such scores, except in the case of synchronisation scores which utilise aspects of staff notation. Even here, such staff notation is generally used to specify the conventionally notated vocal or instrumental part or aspects of the acousmatic part that can be notated in such a way. Much of the music is notated in an *ad hoc* visual representation that follows the general pitch outline on the x-axis and time on the y-axis.

Hence, the perceived relationship between description and prescription afforded by staff notation does not apply here. Those aspects of electroacoustic music that are notated are either notated in such a way that human interpretation is not a necessary end, and even where human interpretation is intended there is no standard form of representation. Moreover, and perhaps most importantly, the acousmatic piece, which exists as a single master tape to be performed without traditional instruments, does not *require* a prescriptive score for its realisation. Such a score may be used by a sound projectionist, but this score does not have the same cultural status as that of a staff-notated piece. Diffusing a tape-piece without such a score is *not* the same as performing a piano piece from memory. Diffusion scores tend to be highly personal, and do not require a cultural code which would allow the score to be read by another sound-projectionist. They perform the same

function that a performer's annotations of a staff-notated score might; they guide those aspects of a performance that are relatively flexible, rather than define those that are immutable. Hence, the prescriptive scores that exist for electroacoustic pieces do not offer any general method for describing acousmatic music. They cannot perform the same role in music analysis that a traditional score performs. Within the traditional music-analytical model the analyst's use of a prescriptive score as a description of the piece is regarded as validated by the traditional and agreed relationship between score and performance, whether or not one wishes to question the validity of this relationship.

Such a breakdown between prescription and description might suggest the need to develop one of a number of possible models of descriptive notation for acousmatic music. The absence of a strong prescriptive-descriptive link forces such models to devise novel visual representations which attempt to capture relevant aspects of pieces. The only criteria by which such relevance can be judged is whether the notation describes the music 'well': efficient prescription is no longer an issue. Three examples will be offered of such descriptive scores which will show a cross section of possible approaches and highlight their individual limitations and the overall difficulties of arriving at a satisfactory descriptive notation. Each example seems to attempt to provide a surrogate for the descriptive validity offered by staff notation. As such each chooses a different replacement for the prescriptive validation offered by staff notation.

The first example comes from Cogan's *New Images of Musical Sound* (1984) which presents analyses based upon "spectrum photos" or sonograms. Sonograms represent the distribution of spectral energy from an acoustic source across frequency and time as a two dimensional visual plot. On these plots the horizontal axis represents elapsed time (from left to right), while the vertical axis represents frequency (from low to high). Energy (amplitude) is

represented by the brightness of the trace (or alternatively the colour). Such descriptions resemble staff-notation in their assignment of parameters to axes, but this should not conceal the entirely different nature of the information displayed.

Cogan bases a discussion of *Fall* by Risset (**music example 1.1**) upon a sonogram of the piece (see figure 1.1; Cogan, 1984, pp. 108-112). He claims that:

> "Prior to the development of spectrum photos, it was very difficult to describe, and understand the kinds of spatial, temporal, and sonic - in a word structural - relationships and transformations that are now apparent in "Fall." Photo 16 [Cogan's sonogram] sheds light on all these elements- revealing, for example, the growing deceleration and "spacing out" of the sonic features in time. This deceleration is so gradual and independent of previous conventions of notated musical rhythm that it has hardly been noticeable."
>
> (Cogan, 1984, p. 111)

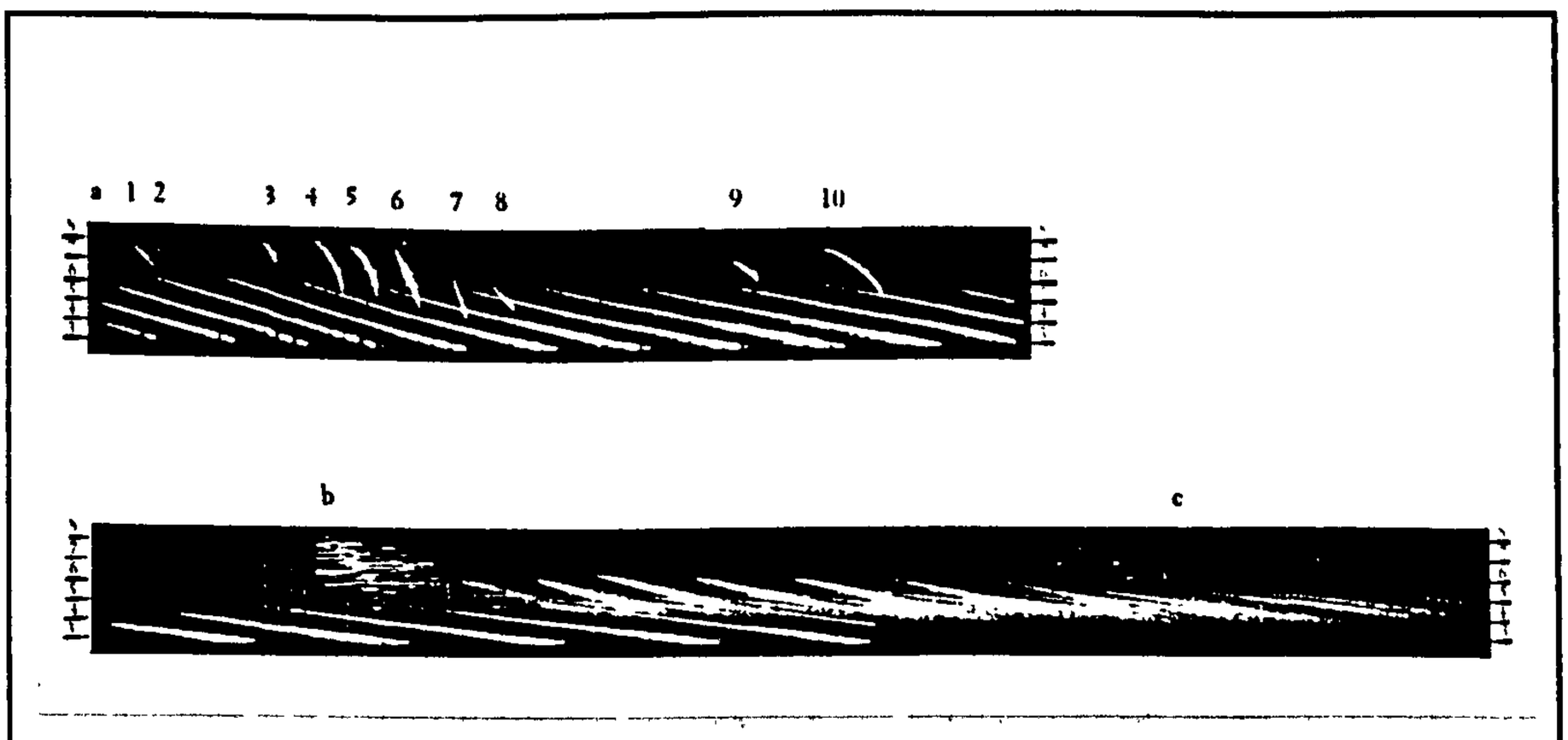

Figure 1.1 Cogan's spectrum photo of "Fall" (Cogan, 1984, p. 109)

It is significant that Cogan stresses the differences between this and traditional notation and that he claims that this affords a better description of the piece's musical structure. This belief reflects both the visual and poietic obsessions that can be traced to a view that the score offers an objective document by which the validity of analytical claims may be judged. Here, it is important to note that although the sonogram displays a spectral description, rather than one based upon a traditional conception of pitch, it corresponds in many other

ways to a surrogate prescriptive score. Just as staff notation is dominated by the need to express pitch and time within a particular framework, the sonogram expresses the kind of information that the composer desires to transmit to his 'player' (in this case an IBM computer). Obviously the sonogram is not the form in which this information is given to the computer. However, the spectral description focuses upon those aspects of the sounds regarded as important by the composer and the program. The particular aural effect achieved in this piece, that of an 'infinite' fall, is specified by a particular spectral configuration (Risset, 1969) which is described very clearly by the sonogram. Moreover, the sonogram describes the kind of instructions required by an additive synthesis algorithm (such as the one used by Risset); frequency components, amplitude and time. Hence, the sonogram describes two things: how the aural effect was achieved by the composer and the spectral structure of the piece. In fact the score is even more like a prescriptive score in this way: it gives us information that would allow us to resynthesize a similar effect. Although sonograms provide descriptions of an acousmatic sound they do so in a way not dissimilar from staff notation. They assume that the *functional* analysis of sound is more important than its perceptual dimensions[4]; structure is seen as a description of how something is made, not as something that is perceived. The sonogram itself tells us nothing about why the spectral description offered produces a particular perceptual result; the "barber-pole" (Cogan, 1984, p. 108) visual description would not to a naive observer suggest a continuous fall. The sonogram reifies spectral information, tempting us to believe that the important information in the piece is somehow hidden from the ear. In terms of a functional or poietic analysis this is

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[4] The distinction between "functional" and "perceptual" forms of analysis is derived from the work of Delalande (1986). A functional analysis is directed towards those aspects of a piece that are to do with its composition, whilst a perceptual analysis is directed towards those aspects that are relevant to the listener. These categories roughly correspond to the poietic and esthesic levels of Nattiez' tripartition of music-analytical discourse (Nattiez, 1990) but do not assume a neutral level of discourse. Delalande's views on the interactions of these two forms of analysis are referred to on p. 33, this thesis.

justified, but it tells us nothing about perception; it assumes that the perceptual phenomenon (a continuous fall) is *a priori* factual and that all that remains is to analyse this 'fall' in a functional fashion; to ask 'how was it made?'. Such an analysis reduces the piece to its construction and is in some ways self-defeating. Risset himself has explained how this effect is achieved; the visual representation merely reinforces the view that the structure is 'given' by the composer and that the role of the analyst is to discover or display such structures. The work of the analyst is reduced to validation: he or she validates the actions of the composer by displaying features that can be assessed in traditional terms. Moreover, there is no guarantee that a sonogram of this kind will lead to an accurate description of this poietic level, since spectral information is not always important to the composer. Sonograms simultaneously masquerade as both poietic *and* neutral analyses. They purport to be neutral in that they are based upon a mechanical acoustic analysis, yet they also provide a specious surrogate for the prescriptive score— a trace of the composer's actions or intentions. Risset's actions as a composer are represented, but in such a way as to suggest that these actions represent the 'structure' of the piece.

It is no accident that Cogan implicitly compares Risset's achievement in this movement to that of Mozart's *Confutatis Maledictis* from the *Requiem*; the whole project described by the book seems to be to identify and accentuate the way in which visual representations of music can be found that allow such comparisons to be drawn between literate and non-literate practices. The sonogram should not be seen as any general solution to problems in the analysis or description of acousmatic music. It serves a particular end, but in doing so obscures the very differences achieved by electroacoustic techniques that make notation so difficult to achieve: the avoidance of conventional rhythmic, timbral and harmonic techniques. The important point to note here is that the listener and the ear are regarded with suspicion, and must be

validated by acoustic and documentary evidence. The fall is regarded not as a perceptual reality, but an illusion, the analysis not as an exploration of what we hear and what it means but of what can be seen and what that means. The object of analysis becomes not the piece but a surrogate score; the sonogram. This leads to the same functional and visual reifications implied, perhaps more justifiably, by the traditional prescriptive score.

The second example of a descriptive notation shares many features with a sonogram, yet more explicitly draws upon a poietic body of evidence. Ligeti's *Artikulation* (**music example 1.2**) is unusual in that it is available as a recording accompanied by a supposedly "*aural*" score (Ligeti/Wehinger, 1970; an extract is shown in figure 1.2). However, it does so in such a way as to present listening as an adjunct to direct knowledge of the composer's working methods and intentions. As such it fixes the piece in a way that a sonogram cannot; its reification is far more unyielding. The object of analysis is not the aural character of the piece. On the contrary, it is a poietic analysis masquerading as an esthesic analysis; function masquerading as perception.

Again, it is enlightening to discuss the claims made for such a score. In the preface, Erhard Karkoschka suggests that:

> "The first aim of the aural score...is to present the listener with basic information that will greatly simplify his further examination of the music and, it is hoped, will spur him on to doing so."
>
> (Ligeti/Wehinger, 1970, pp. 5-6)

In Karkoschka's view an aural score such as Wehinger's should be seen as a way of guiding the listener with visual information which does not impose a traditional notational grid upon the music; instead the music is notated in a fashion that is both an *analysis* and a "sketch for listening", one that allows "no reference to visual fancies" and refers "strictly to the music that already exists" (Karkoschka: in Ligeti/Wehinger, 1970, p. 5).

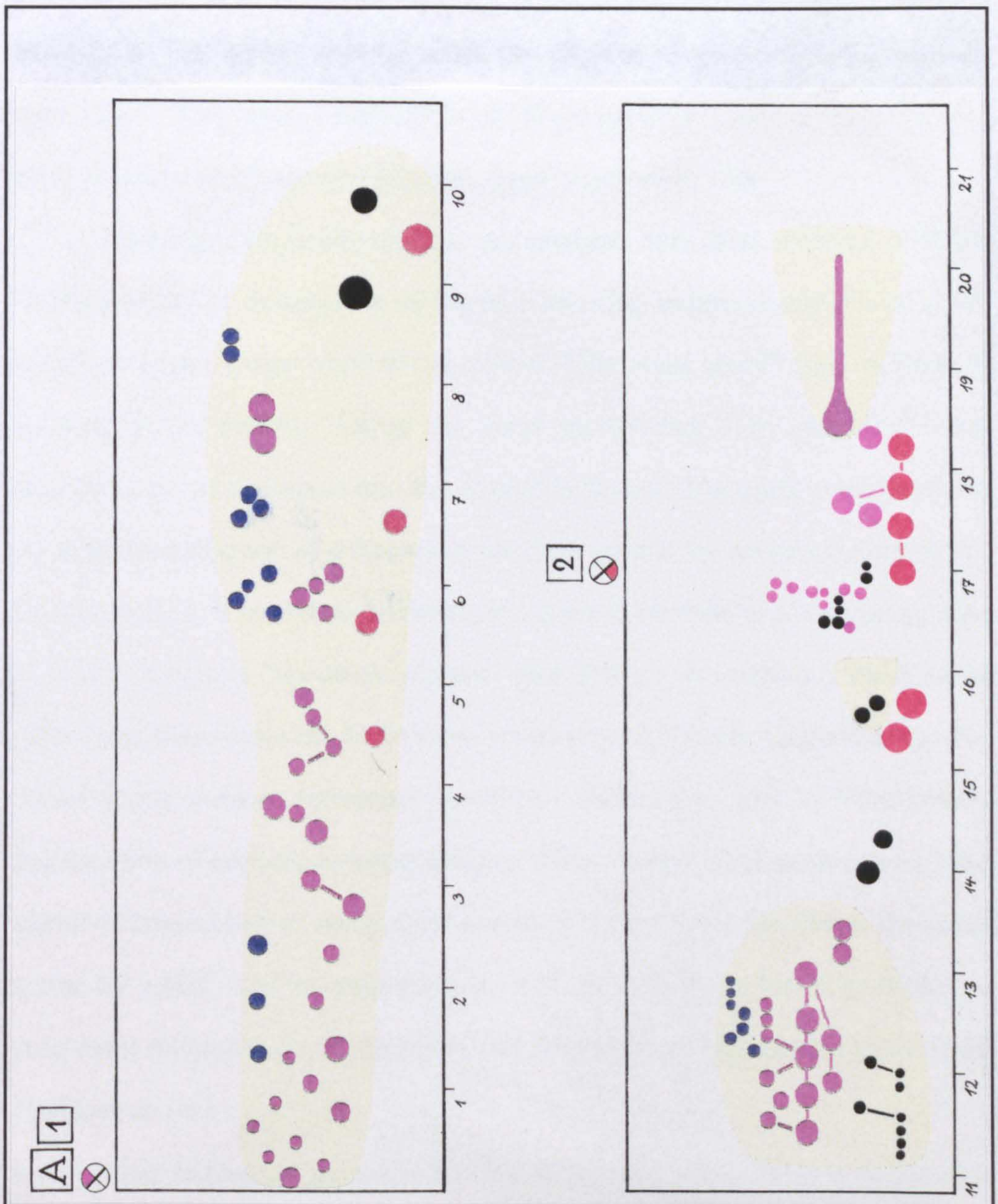

Figure 1.2 Page 1 of Wehinger's score of *Artikulation* (Ligeti/Wehinger, 1970, p. 46)

Is this then to be a score based upon aural perception of a piece, an aural *description*, or a certain analysis, with its own hidden agendas and placing of constraints upon the listener, an aural *prescription*? In fact Wehinger's score is a complex mixture of both; it purports to be both an analysis *and* a score. As such it radically conflates perceptual description with a functional and poietic analysis. Although Wehinger claims that "technical working instructions" or a "realization score" are quite different propositions to an "aural score" or

description and quite correctly notes the absence of performance scores as such (Ligeti/Wehinger, 1970), the aural score presented fails to maintain any clear boundaries between "realization score" and "aural score".

Wehinger explicitly divides his analysis into four sections entitled "Artikulation" (a description of Ligeti's working methods; reproduction of sketches, Ligeti's own view of the piece) "The aural score" (the method of arriving at the score), "Using the aural score" and "The recording" (an annotated set of examples and the complete work). The aural score itself is prefaced by a diagram of a frequency analysis used in the score's construction. On the surface, it seems as if Wehinger's score is derived in a manner similar to that of Cogan's "spectrum photos" (see above). A frequency analysis is performed that forms the basis of a visual representation. Undoubtedly, the visual score is more informative and less misleading, due to Wehinger's combination of such an acoustic analysis with a purely aural approach and the visual differentiation of component sounds in the analysis. However, the aural score by itself, and in combination with the other sections, provides a functional reification far in excess of that achieved by Cogan in his analysis of *Fall* (see above).

This reification occurs in the following way. First, Wehinger chooses to differentiate between sounds in the piece on the basis of acoustic descriptions; he divides the piece into noise, harmonic and subharmonic spectra, and unfiltered and filtered impulses. These categories are further subdivided into filter characteristics or pitchedness (for noise), proportion of noise (harmonic and subharmonic spectra) and pitch (for filtered impulses). These categories and sub-categories of sound are expressed in the score with the horizontal axis representing time and the vertical pitch; loudness is represented by the size of each symbol (or the broadness of the teeth of the comb representing a spectrum). Without entering into a precise summary of Wehinger's symbolic system it is clear that an acoustic description has been

modified according to a set of pragmatic considerations aimed at clearly and unambiguously representing the following parameters: pitch, time, harmonicity, loudness, stereo positioning, and envelope. Moreover, whereas a sonogram makes no concessions to the parsing of sounds into discrete units that may or may not be distinguishable on the basis of a purely spectral description, Wehinger's score, by virtue of its aural validation of acoustic parameters divides the piece up into aural units that could be said to represent *auditory streams*, the perceptual units available to a listener (see McAdams and Bregman, 1979). However, these choices of unit are based upon the assumption that the chosen parameters are those that are to be valued in the music. Moreover, the parameters chosen correspond well to the means of production employed by the composer: oscillators, filters, noise and impulse generators, along with spectral, pitch, amplitude and time information. Hence, the result is an interpretation of the sound according to a spectral description, expressed in a pseudo-conventional manner, categorised according to the actual source, all validated by a flexible admixture of documentary and aural evidence. Instead of an aural score, we are presented with a score that combines a number of different evidential sources dominated by the assumption that the causes of the sounds, as related by the composer and validated by spectral analysis, are the kinds of information needed to transform a spectral description into a visual guide for the listener. As such, the choice of analytical units and the bases upon which sounds are distributed between these units conflates a number of issues in a seemingly illuminating and pragmatic fashion. This conflation leads us to approach the score as if it is an "accurate" and relatively complete description of the piece. However, this accuracy and completeness is misleading: by conflating perceptual, acoustic and poietic measures of pertinence Wehinger presents us with a description that appeals on all fronts but satisfies none. One is led into the temptation to accept the score as a document of similar status to that of the prescriptive,

staff-notated score, which itself conflates perceptual, poietic and 'acoustic' descriptions[5]. This kind of temptation has led Nattiez (1990, pp. 80-81) to misinterpret the value of Wehinger's score as an analytical document; by analysing such an *analysis* does one arrive at a neutral analysis comparable with that based upon a prescriptive score? This question will be addressed below in section 1.2.2.

The next problem with Wehinger's score is its sheer aesthetic appeal. It is undoubtedly one of the most often reproduced documents from the electroacoustic domain due to this visual appeal. This can only intensify the piece's reification in the score. The piece becomes inseparable from the score; we are prevented from analysing the piece as an aural phenomenon. This is all the more damaging when the visual reification is itself based upon such a conflation of analytical evidence. The score is appealing and seemingly veridical, and as such it prevents the listener from exploring the piece in pseudo-neutral fashion. Rather than providing a useful guide for the listener the score becomes a surrogate notational verification of the aural character of the music. Just as the staff-notated score can be used to verify the existence of a heard structure, it is tempting to view Wehinger's score as being more 'real' or 'objective' than the piece itself. However, the aural score does not generate multiple performances in the same way as a staff-notated score; it does not precede performance. The desire to fix the acousmatic work, an aural artefact, by creating a score as a guide for the listener reaches its apotheosis here, and Wehinger's score merely expresses the implicit mistrust of aural data in western 'serious' music culture and its reliance upon literate verification and prescription.

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[5] Although staff-notation does not entail an acoustic analysis *per se* the distinction between perceptual and acoustic descriptions is still valuable here; the score notates pitch and time segmentations that may not be perceived by a listener. A classic example of this is the score to Ligeti's *Atmospheres* where the score prescribes (and describes) a set of complex rhythmic and frequency instructions which are not directly perceived by the listener.

One final limitation of Wehinger's score should be noted. If a general notation for acousmatic works is to be developed, this score provides no model which could be generalised to other pieces. Its concentration upon poietic and acoustic analysis becomes fixed within the notational devices used. The division of sounds into "noise", "spectra" and "impulses" of various kinds may be appropriate here, but would hardly be appropriate for a piece in which source identification or a narrative structure seemed more important. Thus Wehinger's score offers no solution to the more general problems of notating acousmatic music. Rather, it provides an analysis of a particular piece, stressing those features deemed relevant by the analyst.

The last example of an acousmatic 'score' presents a radical attempt to solve notational problems. It results, however, in a similar functional, or poietic reification to that achieved by Cogan and Wehinger (see above). Trevor Wishart has often stressed the role of electroacoustic music in breaking down the literate domination of aural experience: the tendency to notate, prescribe and to divide musical continua into a notatable lattice of discrete values (Wishart, 1978; 1985). Rather than refer to his own documentation of *Red Bird* as a score, Wishart proposes that it is "a document" (Wishart, 1978). It is worthwhile to quote at length from his introduction to this "document":

> "RED BIRD aims, among other things, to use the dynamic-relational structuring of music (and speech) AS AURAL EXPERIENCE, to comment upon the linear-analytic-causal mode of thought and its consequences.
>
> This verbal document is therefore only a commentary on what is an essentially and irreducibly musical experience. No explanation, either in terms of 'what the symbols mean' or 'how the sounds are put together' in a one to one correspondence with the sequence of sounds in the piece, will be offered.
>
> In particular the notion that to understand how the sounds are put together constitutes understanding the music is a fallacy propagated through the visually-distanced logic of some avant-garde music.
>
> It is important to emphasise the distinction between the musical process, and the process of composition. The visually-based constructivist aesthetic equates the perception through sound of the organisation of notes on paper with experiencing the musical process. In most music, in fact, the process of composition (as opposed to the ordering principle which seems

to underlie the resulting organisation of notes on paper, or sounds on tape) is hidden from view, while the musical process is something which arises from the organisation of sounds (via notes on paper in the case of scored music).

The second half of this document will deal with the process of composition itself, for those who may be interested from a practical point of view. For those, however, who merely wish to avoid dealing with the material at face-value, this document will not reveal what the music "really is".

Finally, this is not a complete visual re-representation of RED BIRD because there could be no such thing. A piece of music moves and operates as a dynamic aural experience. This document only indicates certain routes towards an appreciation of that experience.

Music is not translatable."

(Wishart, 1978, p. 1)

On the surface then, Wishart seems to intend a listener's and practitioner's guide similar to that of Wehinger (see above), but avoiding the latter's reification of notation. However, the result of Wishart's document is much the same as that of Wehinger's, perhaps more explicitly poietic, but nevertheless a functional reification. The composer's philosophy, structural analysis and working methods *do* become more than a commentary. Simply avoiding the *form* of standard notation, a note-for-note prescription or description, does not make Wishart's document any less a reification of certain aspects of the piece. In fact the precise narrative and methodological analyses provided by the composer cannot be read as anything but an example of "visually-distanced" (Wishart, 1978) logic. Through damning all "one-to-one" notation, Wishart attacks any effort to describe *Red Bird* in detail; since translation is forbidden, only a paraphrase, or a description of method becomes appropriate. Wishart aligns himself with those who regard acousmatic music as radically aural and quite rightly points out the lack of a prescriptive score upon which to base description. However, he goes further than this: literate musical culture itself is taken to task. It is seen as representing a false image of both compositional thought and aural experience. Hence, all notation is to be mistrusted. Unfortunately, in Wishart's hands this philosophical position leads to a ludicrous situation: rejecting the reification implicit in notation Wishart simultaneously presents us with a detailed set of poietic analyses which

present an equally dubious reification. Without dwelling upon Wishart's score the most important point to note is that like Cogan and Wehinger (see above), it presents an analysis concerned with composition masquerading as perception. Moreover, although it chooses to stress certain unusual features of the piece, such as its narrative structure and ideology, it does so only in relation to the concerns of the composer.

These three solutions take as their model the traditional model of notation as an explicitly prescriptive code which implicitly *describes* the music. Their solutions to the absence of a prescriptive notation upon which to base description note the inappropriateness of traditional, and paradoxically prescriptive, notational devices but retain them as a trace. Cogan's spectrum photos (Cogan, 1984) *replace* the discrete division of pitch and notate the spectral composition of sounds over time, yet retain the trace of the staff in their pitch-time axes, and retain the trace of the score's role as the arbiter of structural analyses. Equally, Cogan manages to present us with a view of structure that implicitly reifies poiesis in its concentration upon spectral analysis. Wehinger's "aural score" (Wehinger/Ligeti, 1970) again retains the trace of the staff, and despite its perceptual veracity simultaneously emphasises the trace of the composer's actions in its classification of sound material in a fashion that recalls the use of the score as a document which represents the 'message' of the composer. Finally, Wishart's "document" (Wishart, 1978), in reacting against the domination of aural experience by notation, again preserves the trace of the traditional score. The composer's interpretation of structural and methodological matters is presented in documentary form; the artist's 'message', normally to be found in a prescriptive score as an implicit feature, is given a surrogate and explicit existence in the 'document'.

These efforts at providing a notation for acousmatic pieces are hindered by their retention of a traditional view of notation. They preserve the

notion that a score provides a link with the actions of the composer. Hence, despite the documentary value of such scores as information that may allow the listener or analyst access to poiesis, they provide descriptions that conflate esthesis with poiesis, denying the very aurality claimed for acousmatic music. What is needed is a description of acousmatic music that reflects this aurality by redressing the balance between identifying those structures that may be heard and interpreted without knowledge of the composer's actions and those that require or reflect poietic evidence. Moreover, why should a score of a piece conceived "pour l'écoute et par l'écoute" (Delalande, 1986) be necessary? Such a score can have a pragmatic value in the practice of sound diffusion, but seems quite inappropriate as a description of an aural practice. Surely an aural tradition demands a descriptive language that is commensurate with what may be heard, rather than what is *revealed* by spectral analysis or the composer's documentation. The three examples describe the music as if understanding how something is made can fully explain our experience of that event. This is both reductionist and positivist: notation here serves to *reduce* experience to what can be visually displayed and to the specious intentions of an absent composer, and to identify description with the verification of experience through comparison with a fixed 'object'— the score.

However, one should not reject notation merely because notational models tend to reproduce the traditional model of notation. Description of music, its translation into verbal, symbolic, textual or other media is not doomed to failure, as implied by Wishart's claim that "Music is not translatable" (Wishart, 1978, p. 1). Such a view inevitably leads to a musical solipsism that is of no benefit to developing a greater understanding of musical culture. How else but by such translations can one begin to make sense of any phenomenon? As Rorty claims (Rorty, 1980) the difficulty of translation between different types of discourse should not be a cause for despair. Rather, such difficulty is the basis for all interpretation; an attempt

must be made to translate between discourses if we are not to consign ourselves to the radical fragmentation of specialised languages. In this case the danger is an ever-present one: the supposed 'incomprehensibility' of much contemporary musical practice cannot be tackled by remaining within the discourse of the specialist composer. This does not mean that the views of composers should not be heeded. Rather, it is important that an attempt is made to reconcile the aural experiences of the listener with the techniques used to create pieces. If this is to occur, the kinds of description presented in this section must be complemented by descriptions based upon aural perception[6]. This argument resembles that of Delalande (1986), who stresses the fact that it is not enough to concentrate upon "functional" analyses (analyses fonctionelles), those that analyse how things are made: "perceptual analyses" (analyses perceptives) must be developed to arrive at any notion of how compositional practice relates to aural experience.

1.2.2 Theory and acousmatic music

This leads neatly onto questions of music theory. In order to analyse a piece of music, analysts must decide what 'object' they wish to analyse. More specifically, they must decide how they wish to divide this 'object' up into units. This latter decision applies equally to all analyses, whether they propose that such units combine to form an organic whole, or whether they propose that no such higher order structural interpretation is appropriate, or whether some combination of these ideologies is fitting. Notation, in its reified form, forms one source for such an object and its division. Nattiez has claimed (Nattiez, 1990 and see this chapter, p. 16) that the score is a source from which essentially "neutral" analyses may be performed, and that the discrete units provided by notation may take on an essentially neutral status by virtue of their cultural contingency. For an aural tradition such as acousmatic music,

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[6] See, however, section 1.2.3. Aural perception is not the only kind of perception that may be relevant to the description of acousmatic music.

unless a score exists, such an approach may not be taken. Moreover, as argued above, existing acousmatic scores contain too many hidden agendas to be regarded as in any way 'neutral', despite Nattiez' claims to the contrary (Nattiez, 1990, pp. 81-82). Hence, for acousmatic music, theoretical constructs, especially those based upon some view of auditory perception, are often seen as providing a basis for determining what the analytical object is and how it should be analysed, reflecting the aural ideology of much acousmatic practice. In order to show that, as with notation, many such theoretical constructs contain the implicit and arguably inappropriate application of traditional assumptions, a number of examples will be discussed. It will be seen that even where radical or non-traditional theories are developed, these fail to meet the challenges inherent in acousmatic music to the full.

The examples fall into two groups. The first is represented by the theoretical writings of Pierre Schaeffer, as presented in his *Traité des objets musicaux* (Schaeffer, 1966). Schaeffer's ideas will be used to demonstrate the distance between proposing theoretical constructs as the basis for description and prescription. Although strongly reflecting the non-literate concerns of an aural compositional culture, Schaeffer's program will be read here as an effort to prescribe musical discourse, rather than as the basis for the kinds of perceptual descriptions that might benefit less "functional" analytical endeavours (see Delalande, 1986; also the last paragraph, section 1.2.1). The second group of writings similarly stresses *perception* as the basis for building descriptions of electroacoustic music. This approach may be generically described as *timbral* and is exemplified by the development of Schoenberg's concept of "Klangfarbenmelodie" (Schoenberg, 1973, p. 421) into a controllable and perceptually relevant musical parameter. As with the work of Schaeffer (1966), this branch of electroacoustic research will be shown to reflect a number of implicitly functional and prescriptive concerns which limit

its relevance to developing a truly *descriptive* method for performing perceptual analyses. Surprisingly, despite the surface differences between these two approaches to perceptual research, both will be shown (in their rather different ways) to share a concern not only with "functional analysis" (Delalande, 1986), but also to share other features— most markedly a concentration upon musical structure as a self-referential construct, and a reductionist view of listening.

Within the field of electroacoustic music, the two terms *objet sonore* and *écoute réduite* (Schaeffer, 1966) have had a particular importance in delineating an aural approach to compositional theory. However their original place within a larger and highly prescriptive endeavour to propose a *recherche musicale* (Schaeffer, 1966) limit their usefulness as analytical concepts. Their original use points towards the development of new compositional listening strategies and commensurately radical structures based upon these, rather than any attempt to propose a method for describing how these structures will be perceived by an ordinary listener. Schaeffer himself stresses the various kinds of aural experiences available to listeners in his etymological and structuralist notion of *les quatres écoutes* (Schaeffer, 1966, pp. 103-128). He distinguishes between the indexical mode of listening, concerned with the identification of the sources of sounds, the events that are responsible for the *emission* of sound (*écouter*), and listening as a symbolic mode, to do with sounds as signs, the relationship of sounds as signifiers to signifieds that are *extra-sonores* (*comprendre*). Similarly, he identifies two other modes of listening which do not refer beyond a sound itself; *Ouïr*, the naive reception of a sound's occurrence, and *entendre*, the attention to certain qualities of a sound itself, without reference to its source or significance.

Schaeffer, however proposes a program of musical research which aims to develop the everyday (*banale*), active, yet non-referential listening of *entendre* into a specialised (*praticienne*), semiotic system, equivalent to pre-

existing musical and linguistic systems in its relational and abstract nature, yet wholly different in its basis in the development of "natural" listening (Schaeffer, 1966, especially pp. 360-385). Unlike *écoute traditionelle*, the traditional musical model, where a "repertoire of timbres" (*écouter*) and a system of musical values (*comprendre*) lead to the types of listening appropriate to a traditional sound-world, *la recherche musicale* is to be based upon the development of a system of musical values and structures based upon a return to the sound itself, mostly through the type of listening Schaeffer identifies as *entendre.* For this reversal of musical practice Schaeffer proposes a radical and specialised form of listening: *l'écoute réduite*, or reduced listening (Schaeffer, 1966, pp. 261-279, 349-359) in order that familiar sources and semiotic systems should not play any part in this research. This reduction is based upon the philosophical notion of "bracketing" derived from Husserl. The *objet sonore* as an in-itself is to be discovered by placing significations and causes in brackets, so to speak. In this sense, Schaeffer's approach proposes that acousmatic music should be structured according to an intrinsic model of musical discourse. The basis of his research is that a musical language may be constructed which is independent from sounds' extrinsic properties. His *solfège* is not just based upon the rejection of sounds' relationships with musical systems, but on a deeper rejection of their relationship with the world. It is in this sense that Schaeffer recapitulates the intrinsic biases of music theory (see section 1.3).

There are a number of reasons why this model for musical research cannot provide a satisfactory basis for delineating the kinds of objects and structures of interest to the music analyst[7]. Schaeffer's model is intentionally

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[7] This is not to suggest that Schaeffer's ideas *per se* have no relevance to the analyst. His discussions of the relationship of listening to culture and nature, his perspicacious accounts of the problems inherent within traditional views of listening and musical discourse (Schaeffer, 1966) have been instrumental in defining the challenges posed by the acousmatic and have been instrumental in shaping this thesis. However, this should not allow one to ignore the dangers of confusing the descriptive parts of his treatise with those that are prescriptive. Similarly, one should not accept the mistrust of extrinsic reference in his account of musical activity without question (see section 1.3).

prescriptive and *must* lead to functional rather than perceptual analyses. Why is this so? Surely *la recherche musicale* provides the analyst with a ready-made, aural method for identifying pertinent units and for identifying their structural relationships within a piece of music? On the contrary, this *would* be the case if one assumes that the only aspect the analyst focuses upon is *entendre* and *ouïr* and is willing to ignore the everyday, musical or linguistic references presented to us by sounds. There is no reason to assume that listeners adopt such a radically dislocated position towards the sounds of an acousmatic piece, and hence no reason why a perceptual analysis should follow any of Schaeffer's prescriptions. Moreover, one must question whether such a radical empiricism is possible for any listener, whether composer or not. Even if the 'bracketing' of sounds is successfully practised within the poietic domain one must be careful to distinguish between the intentions and practices of composers and the perceptions of the listener, whether from a poststructuralist mistrust of the role of the author in delimiting meaning (e.g. Eco, 1979; Barthes, 1977a), or from the perspective of Nattiez (1990) who stresses the very different types of analytical endeavour available to the music analyst. Reduced listening may provide an insight into poiesis, but has limited relevance to esthesic analysis. Nattiez does propose that neutral analyses should reflect the cultural concerns of a musical tradition which suggests that Schaeffer's theories could be used to develop a relevant analysis of the neutral level. For this to make sense, however, one would first have to demonstrate that Schaeffer's theories have the status of representing an identifiable musical practice: an extremely difficult endeavour, if possible at all. Moreover, even if this were possible, the conflation of the poietic and neutral levels would be as pernicious here as it is for Nattiez' discussion of the role of notation in the analysis of aural traditions (see 1.2.1). Hence, it is instructive to refer again to Delalande's distinction between "analyses fonctionelles" and "analyses perceptives" (Delalande, 1986). A functional analysis might need to take

account of 'reduced listening', but not a perceptual analysis. Reduced listening is a theoretical construct through which Schaeffer attempts to prescribe musical practice, and as such is precisely the kind of prescriptive account of acousmatic music which perceptual descriptions should be aiming to question, regardless of whether such descriptions are intended as forming the basis for perceptual verification of compositional strategies[8].

Whereas Schaeffer (1966) attempts to define new methods of description which challenge traditional music-theoretical assumptions, especially in his desire to develop a new system of musical relationships from attention to a "bracketed" *objet sonore*, a parallel strand of perceptual research has aimed to address the theoretical problems of electroacoustic techniques from within existing views of musical structure. Here, the manipulation of *timbre* is seen as paramount, a concern that implicitly maintains the traditional distinctions between pitch, rhythm and instrumentation. Timbre is seen as a parameter, a quantifiable aspect of sound. Hence, timbral research focuses upon discovering ways in which electroacoustic techniques can be harnessed to produce timbral structures that are similar to those of pitch and rhythm, but distinct from them. Although such a view acknowledges the new potentials inherent in electroacoustic techniques, especially in the broadening of the sonic palette, this development maintains the view that a parameterisation of timbre can be achieved which allows the practice of orchestration to develop into a carrier of abstract musical structures. Research within this context can be seen to develop Schoenberg's analogy between melodies articulated by pitch and sound colour:

> "...our attention to tone colours is becoming more and more active, is moving closer and closer to the possibility of describing and organising them. At the same time, probably to restrictive theories as well. For the present we judge the artistic effect of these relationships only by feeling. How all that relates to the essence of natural sound we do not know, perhaps

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[8] Such a prescriptive role for perceptual research is not an aim of the present thesis. However, some theorists, including Delalande (1986, also see Lerdahl, 1988) regard this as one of the primary goals of perceptual research.

> we can hardly guess at it; but we do write progressions of tone colours without a worry, and they do somehow satisfy a sense of beauty. *What system underlies these progressions?*...Now, if it is possible to create patterns out of tone colours that are differentiated according to pitch, patterns we call 'melodies', ...then it must be possible to make such progressions out of the tone colours (themselves)...progressions whose relations with one another work with a kind of logic entirely equivalent to that logic which satisfies us in the melody of pitches."
>
> (Schoenberg, 1973, p. 421. emphasis added)

The aim of discovering a system through which timbral progressions may be controlled and predicted contains within it the view that timbre can be organised according to the same structural principles as pitch. Hence, research of this kind has attempted to show that timbre, like musical pitch, can be organised on the basis of a discrete division of a linear continuum (or a number of such continua). The absence of a system through which this may be achieved has led to a number of perceptually motivated studies that have aimed to quantify the relationships between different timbres, relationships previously regarded as qualitative.

Grey (1977; see also Grey and Gordon, 1978) carried out a number of studies which aimed to identify the perceived relationships between a number of instrumental timbres and the acoustic correlates of these relationships. According to the multidimensional analysis of listeners' similarity judgements the timbres of these synthesised instruments can be reduced to three perceptual dimensions which correspond roughly to three acoustic dimensions: spectral energy distribution, spectral envelope and the presence of high frequency components during the attack (Grey, 1977). McAdams (1993) characterises these three dimensions as *brightness*, *spectral flux* and *presence of attack transients*. Although most subsequent research of this kind has stressed the abstract nature of these three dimensions (e.g. Wessel, 1979; McAdams and Cunibile, 1992) it is important to note that Grey provides an alternative description of the last two dimensions: in this plane the instrumental sounds are clustered according to their instrumental families

(Grey, 1977, p. 1274). This implies that one cannot consider these two dimensions independently from their instrumental origins, especially since only instrumental sounds were analysed. Moreover, Kendall and Carterette (1991) stress that the multidimensional approach cannot tell us anything about the perceptual relationships between points in the multidimensional space that do not correspond to the calculated positions of sounds used within a particular study. One cannot, therefore assume that moving along one or other dimension will produce a continuum of 'perceived brightness' or 'spectral flux'; only discontinuous successions of the sounds used in a particular study which fall in a straight line can be expected to behave in such a way. Hence, such work does not support a notion of timbre as an abstract quality, unrelated to instrumental source; and the dimensions isolated have no necessary relevance to sounds that have not been judged in a similarity task.

The multidimensional approach to timbre has led to the notion of using movement in "timbre space" as a predictable and structurally salient musical parameter. Hence, Wessel (1979) has attempted to show that the multidimensional map of the 'distances' between timbres can be used to generate perceptually equivalent timbral vectors. Such timbral vectors may be transposed to form perceptually equivalent relationships between any pair of points within the timbre space. In this way the pitch analogy is taken to its logical conclusion. Just as in a multidimensional pitch space a perceptually veracious representation of the distance between two pitches (or chords) can be calculated, so may the distance between two timbres be calculated. This raises the possibility that pitch and timbre may be manipulated in much the same way; according to relationships of equivalent transpositions between discrete values, along a number of dimensions. Extending such a notion to the infinite possibilities of timbral synthesis and manipulation afforded by electroacoustic music is problematic, however. Although attempts have been made to determine whether equivalent transformations can be found between

two *known* timbres and two non-instrumental (hybrid) timbres these remain inconclusive (see McAdams and Cunibile, 1992; McAdams, 1993). It is one thing to show that the cor anglais-oboe vector is analogous to that of 'cello-Eb clarinet; it is quite a different proposition that a vector between two non-instrumental timbres may be found that matches this transposition. Similarly, the discrete nature of the points within timbre space does not necessarily suggest that intermediate points upon such vectors can be assigned any quantitative value; Kendall and Carterette (1991) note the danger of assuming that a multidimensional space may be used in this way, as discussed above. Nevertheless, such research implies that timbre could be used to form relationships of distance and transposition, suggesting that, like pitch, timbre may be structured according to equal and equivalent divisions along a number of dimensions.

Theorists such as Slawson (1985) and Lerdahl (1987) have approached timbre in a similar fashion, regarding it as a parameter which suggests analogous musical structures to those of pitch. Slawson's work (1985), although largely independent from the rigorous empirical approach of Grey (1977) and Wessel (1979) is based upon a similar notion of a timbral space and will not be discussed at length here except to note its reliance upon a specious and limiting reliance on the mapping between steady-state vowel spectra and instrumental or synthetic tones. However, Lerdahl's work illustrates the dangers of assuming that timbre may be regarded as analogous to pitch. Lerdahl (1987) proposes that despite a number of significant differences between timbre and pitch, the former may be organised hierarchically, using "steps", "leaps", "neighbouring functions" and "passing functions". Lerdahl proposes that timbre can not only be arranged in scalar form, but that such scales are directional, leading to progressions between more or less "dissonant" timbres. Hence, a movement from a less dissonant to a more dissonant timbre would give a right branching tree structure while the

converse results in a left-branching structure, dissonance defined in this case by the amount of vibrato and the harmonicity of the timbre[9]. Such a view of timbral structure explicitly attempts to map Lerdahl's conception of pitch structure (Lerdahl and Jackendoff, 1983) onto timbre; here Lerdahl attempts to complete the programme of research suggested by Schoenberg (see quote above). Despite Lerdahl's concern with perceptual and cognitive salience (Lerdahl, 1988), no empirical evidence is offered; only anecdotal evidence is used to support his synthesis experiments. Timbre is reduced to only those aspects that may be organised hierarchically (Lerdahl, 1987), following Lerdahl's preoccupation with well-formed hierarchical structures (see also Lerdahl, 1988).

Although Lerdahl's research is an extreme case of imposing traditional assumptions upon timbre, and is explicitly prescriptive and functional, the explicit appeals he makes are quite clearly to be found within all timbral research. Why should timbre be regarded as a parameter of the same kind as pitch and rhythm? The very distinctions between such parameters are undermined by the nature of electroacoustic techniques; as Smalley (1986) notes, it is more sensible to regard the fine grained analysis, manipulation and synthesis of sounds as a motivation for doing away with such discrete musical categories. The spectral composition of a sound over time, its spectromorphology, subsumes the categories of pitch and rhythm in such a way as to make them unnecessary. Moreover, the assumption that timbre is analogous to pitch and rhythm perpetuates the ideology of musical structure as a self-referential system. Timbre, in this way, becomes divorced from its acoustic source to become another abstract parameter.

Such a dislocation of musical parameters cannot form the basis for developing a truly perceptual and descriptive analysis of an electroacoustic

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[9] Vibrato is regarded as more dissonant at extremes, whereas harmonicity is a linear scale where dissonance is inversely proportional to harmonicity (Lerdahl, 1987).

piece. Like Schaeffer's work (see above), it reifies the "functional"[10] and abstract at the expense of the "perceptual" and the extramusical, and fails to take account of sound's iconic and indexical significance for the listener. Although the empirical research claims perceptual and cognitive validity for such constructs as "timbre space" (Wessel, 1979), such validity is, as will be shown (see Chapter 2 and section 1.3), specious when one considers the assumptions that underlie such research and its application. A perceptual approach, however empirical, should not be allowed to verify or prescribe musical norms if it fails to account for its implicit *music-theoretical* assumptions about the nature of music and musical experience. The major assumption made here, that timbre is an intrinsic structural component should not be accepted as a basis for perceptual research, and ultimately, for perceptual descriptions without serious misgivings, especially noting the cautionary advice of Kendall and Carterette (1991) and Grey's own recognition of the source-related nature of at least two of the supposedly abstract dimensions of timbre. Moreover, such research has concentrated upon instrument-type sounds; one must question the applicability of such research to the multiplicity of sound types used in acousmatic music.

Unlike Schaeffer's work, its expansion of traditional music-theoretic approaches to the analysis of electroacoustic sounds and its reductionism, manifested in its twin obsessions with scaling and the separability of musical parameters, provides an additional set of assumptions that should be challenged. Acousmatic music, it is implied, is not only to be approached as if

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[10] It may seem odd that a number of perceptual theories of timbre are grouped together here as "functional". It must be remembered that the distinction between functional and perceptual *analyses* is at issue here, not between functional and perceptual approaches. The approach, for example, of Wessel (1979), is to carry out research which reflects compositional aims; the control of timbre by composers. What is at issue in this case is to control timbre in a way which reflects the perceptual salience of timbral similarities. However, such an approach assumes *a priori* that the compositional and theoretical assumption that timbre is an independent structural variable has perceptual relevance to the listener in a realistic musical situation (see Chapter 2 and section 1.3 for discussions of timbral research *vis-a-vis* realism in perceptual research). The implicitly and explicitly functional *aims* of such research, expressed as implicit music-theoretical assumptions, severely limit its application to the formation of perceptual analyses.

it were wholly intrinsic in its structure, it is also to be approached as if such intrinsic structures mirror those of traditional music theory. An analysis based upon such a view of musical structure must ignore the role of "timbre" as evidence for instrumental causation, pre-existing cultural signification, and social mediation. Moreover, it neatly sidelines the collapse of separate musical parameters noted as inherent within electroacoustic techniques by Smalley (1986) and Wishart (1985). Empirical studies of auditory similarity will be returned to in the next chapter, including those that focus upon so-called non-musical sounds.

In summary, two major approaches to the theory of electroacoustic sounds have been discussed. Each has been shown to betray a number of unwarranted assumptions regarding the pertinent musical structures of electroacoustic music. Both, to differing extents, impose traditional views of musical discourse upon electroacoustic music without questioning their appropriateness. First, it is assumed that perceptual research should reflect functional motivations, as opposed to purely perceptual concerns. This is true even of the seemingly perceptual approach from which "timbre space" (e.g. Wessel, 1979) is derived; the parameterisation of timbre reflects the desire for compositional control, a desire which is expressed in the reductionist experimental methodology applied to timbral research. Second, these approaches assume that only abstract and intrinsic musical structures are at issue; sounds are assumed to function as expression units within a purely musical system, without reference to extramusical considerations.

This thesis, concerned as it is with placing the acousmatic within a broad context of auditory perception must question such assumptions. Within such a broad context the assumption of structural autonomy and a functional perspective cannot simply be assumed. To assume *a priori* that electroacoustic sounds are perceived as abstract units, and that functional music-theoretic constructs have any relevance to the naive listener is to assume that such

descriptive frameworks are implicit within the perceptual systems or cognitive representations of such a listener. Whether or not such assumptions are valid remains open to question. Here, through examining these assumptions within a broader context, from outside music, so to speak, a perspective will be gained that places "musical" discourse within its "everyday" context. Only through taking account of the context afforded by the everyday environment can one understand the immanent structure of acousmatic works.

1.2.3 Summary: perception, description and analysis

Both in sections 1.2.1 and 1.2.2 a number of assumptions can be seen to have been drawn from traditional music theory. Although perceptual issues are addressed by many notational and theoretical approaches, perception is seen as operating within the boundaries provided by a traditional view of musical discourse. This position is exemplified by the retention of prescriptive models in notation, where it is assumed that the structure of a work is something that the composer communicates to the listener: here certain aspects of structure may not be available to the listener (e.g. the spectral structure of an aural illusion cf. Cogan's discussion of *Fall*, see section 1.2.1). Descriptions based upon the notion that a score is the final arbiter of aural experience relegate auditory perception, the only experience of the acousmatic work itself, to a position secondary to some visual representation or analysis. Perception is here mistrusted and hence requires verification: it is to be compared to the intentions of the composer, or to some notatable aspect of the piece. The analyst's perceptions may play a role in producing such a score, but these are generally mediated by pragmatic notational considerations, documentary knowledge of the composer's intentions or some form of spectral analysis. Similarly, approaches to the theory of acousmatic music (see section 1.2.2) fail to do more than overlay perceptual concerns upon traditional music theory. The concern here is not what is perceived by a *listener*, but which

abstract and intrinsic structures may be perceived (Schaeffer, 1966) or controlled (Wessel, 1979) by the *composer*. Both notationally and theoretically motivated attempts to describe electroacoustic music in perceptual terms founder upon the functional, or prescriptive concerns adopted. Such research is motivated by the need to constrain notation or composition in perceptually motivated ways; 'perception' is seen as a limit upon pre-existing models, rather than the basis upon which such models should be built. Here, such assumptions will be rejected in order to develop methods of describing the acousmatic work that do not assume traditional notational or theoretical models. Moreover, rather than merely rejecting such assumptions, an attempt will be made to describe acousmatic music from the standpoint of the perceptions of the listener. This approach can be seen to offer the following benefits:

1. *Pragmatic*: to identify pertinent units and structural relationships
2. *Perceptual*: to develop a theory that corresponds to the listener's experiences
3. To produce a perceptual analysis *as opposed to* a functional analysis

To perform any kind of structural analysis of acousmatic music requires that a definition of pertinence be developed. Without such a definition it is impossible to delineate the criteria upon which a work is to be divided into significant units. Hence, segmentation or "discretization" (Nattiez, 1990, pp. 80-81) requires a definition of pertinence. Even where such a definition is left implicit, rather than stated explicitly, a decision must be made as to what units form the basis of an analysis. For notated music, notes, motifs, phrases, chords, voices and so on may be identified in the score or through listening and may form the pertinent units of an analysis. Although such units may be identified without the use of notation the strong links between prescriptive notation, musical practice and accepted descriptions of music allow for the score to be treated as a document which verifies aural

experience (see section 1.1.1); moreover, notation is seen as a trace of historically valid and musically pertinent divisions of the acoustic continuum (Nattiez, 1990, pp. 80-81). In combination with music theoretical definitions of structural units, notated units can be said to have a degree of perceptual relevance. However, the pertinent units of acousmatic music cannot be defined in this way. Unless one accepts the dubious assumptions of existing notational or theoretical positions *vis-a-vis* the acousmatic (see sections 1.2.1 and 1.2.2) there is no existing theoretical or notational definition of pertinence appropriate for analysing electroacoustic music. Some effort is necessary to define which acoustic changes are relevant and which are not. Here, rather than adopting a functional definition of pertinence, one that has compositional relevance, an effort will be made to define pertinence according to the listener.

Two motivations can be cited for developing a perceptually-based, listener-oriented definition of pertinence. Firstly, such a definition allows analyses to be performed that respect the aural nature of acousmatic practice. Secondly, it ensures that such analyses escape from merely serving to 'reveal' compositional intentions. These motivations extend to any attempt to perform structural analyses of acousmatic works. Whereas an analysis of a notated work might focus on the repetition of notated units (e.g. Nattiez, 1982) an analysis of an acousmatic work must define not only what the smallest units are, but which relationships pertain between them.

The notion that acousmatic music is composed for the ear and by the ear (Delalande, 1986) has been offered above as the grounds for rejecting theoretical definitions of pertinence that ignore perception. This notion deserves additional discussion. To propose that an aural practice *requires* aural analysis would be to repeat the functional reification so strongly criticised above in relation to the notation and theory of acousmatic music. Consider a listener at a concert of tape-pieces; such a listener is presented with sounds through a number of loudspeakers and must form some interpretation

of these sounds. One issue this thesis aims to address is how might one attempt to describe such an interpretation, based upon aural experience alone. However, the premise that only aural experience is relevant in such an interpretation is not accepted. Other modes of perception may be brought to bear on the acousmatic work. For example, the visual perception that no live performers are producing the sounds heard may be vital to our understanding of the acousmatic. Hence, rather than blindly following such a functionally motivated premise, perception in general must be considered in forming descriptions of the acousmatic work, though auditory perception of course occupies a peculiarly important position.

1.3 Extrinsic and intrinsic: reclaiming mimesis

1.3.0 Material in acousmatic music

A number of pedagogical, notational and theoretical concerns have been addressed up to this point. However, the acousmatic work presents another, and perhaps more important, challenge to the analyst. When one considers the *material* of electroacoustic music one immediately confronts material that is not traditionally considered as music at all. Electroacoustic techniques have led to the inclusion of non-instrumental, non-vocal sounds obtained from the everyday environment, and the synthesis and manipulation of instrumental, vocal, everyday and wholly original sounds. Although such a broadening of the notion of musical material has a long history, either in terms of the imitation of 'extramusical' events, or the inclusion of novel sound sources, electroacoustic techniques have brought such inclusions into the foreground of musical discourse. Many such sounds have recognisable sources, and even where such sources are hidden, *surrogate* sources may be perceived and may be relevant to theory (Smalley, 1986).

Such tendencies require a new attention to the concept of *mimesis*.[11] Acousmatic music often draws upon the sounds of the world in a direct, unmediated fashion, in contrast to the highly mediated, structured world of traditional musical material. It will be argued that even where attempts are made to conceal this mimetic resurgence, such mimetic practices are often highly significant. More importantly, this mimetic aspect of acousmatic music will be shown to be significant not only in terms of pure theory, but also in terms of the listener's perception of the work. Just as the acousmatic work requires one to reassess the roles of music theory and notation in building perceptual descriptions, so it also demands a fresh examination of the roles of intrinsic and extrinsic reference in such descriptions. As observed in section 1.2, both timbral and Schaefferian perspectives preserve a view of musical structure that is abstract and self-referential. Here, this notion will be challenged, firstly in relation to musical discourse in general, then in relation to acousmatic music. Acousmatic music reveals and highlights the ever-present tension between intrinsic and extrinsic frames of reference within music, and moreover, produces a radical shift in the relative importance of these two polarities. This demands attention to the perceived origins of sounds employed within the acousmatic work, an attention denied within traditional frames of musical reference just as it is denied within most current approaches to the structure of acousmatic music.

1.3.1 Intrinsic and extrinsic structure

In linguistics it is customary to distinguish between syntax and semantics, between the rules which govern whether a sentence is grammatical, and those which govern the way in which sentences refer to, or signify conceptual or real-world entities. This division between grammaticality and reference is

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[11] Mimesis is here used in the broad sense offered by Emmerson (1986) who does not distinguish between the representation of *nature* and the representation of other non-musical artefacts. Another definition, which subsumes this one, but has a number of important differences will be introduced and discussed in Chapter 6.

highlighted in the work of Chomsky (e.g. 1957) where syntax is examined independently of semantic concerns. Attempts to apply linguistic models to musical structure often point out the absence of such a distinction within music, which is seen as primarily self-referential. In fact the major difference between language and music is seen as its abstractedness from the everyday world. This ideology is summed up by Monelle (1992):

> "It is clear that music... is a self-regulating system of transformations... It is, perhaps, more apparent in music than elsewhere that significance inheres in relations, not in things. A single note is meaningless, but intervals, patterns, changes in volume, tempo and timbre, and above all rhythms are the prime bearers of musical significance. This is to speak of musical significance in its most fundamental sense, not in the lexical sense which still pervades Saussure and has passed over into some writers on music."
>
> (Monelle, 1992, p. 58)

Hence, structural approaches tend to stress the priority of intrinsic reference in music at the expense of extrinsic reference. Lerdahl and Jackendoff (1983), for example, concentrate upon a set of rules to describe the hierarchical relationships between elements in a musical work, Narmour (e.g. 1977) and Meyer (1967; 1973) upon the way in which certain musical patterns imply structural completions, and Nattiez (e.g. 1982) upon the ways in which the repetition of musical units can be seen as analogous to the paradigmatic axis of distributional linguistic analysis.

This concentration upon music as a closed system is not isolated to current structural research. Most analytical procedures emphasise the nature of music as a self-referential system, whether in terms of voice-leading, interval content, or motivic structure. Acousmatic music directly challenges this reification of intrinsic structure in its use of everyday sounds and in its avoidance of traditional musical structures. First, however, it is necessary to present a critique of the ideology underlying the concentration upon intrinsic structure in music theory. Through this critique it will become clear that acousmatic music is unusual in its concentration upon mimesis yet should also be viewed as an important step in the *reclamation* of an ever-present, yet too

often ignored, aspect of musical structure. The following sections will outline the theoretical background to the polarisation and reification of abstract structure in music, and outline some alternatives to this dominant position.

1.3.2 The ideology of absolute music: the reification of syntax

> "The ideas which a composer expresses are of a *purely musical* nature..."
>
> (Hanslick, 1974, p. 35)

> "Apart from a few onomatopoetic themes... music has no literal meaning."
>
> (Langer, 1956, p. 232)

Despite the commonly held belief that music 'communicates', and that it may communicate emotional states and concepts and hence refer to the everyday world, such a view is not always shared by music theorists and aestheticians. In the last section some specific theoretical approaches were shown to maintain a belief in the primacy of intrinsic reference, and in this section, two aesthetic approaches will be briefly examined that illustrate the ideological background to such theoretical solipsism.

Hanslick (1974) and Langer (1956) propose that music is in the main unable to refer to the world. According to such a proposition, the mimetic aspect of music is relegated to the position of an incidental supplement to music's intrinsic workings. Hanslick (1974) attempts to dispel the view that music has any emotional content *per se* or that music might *represent* emotions. Langer (1953; 1956), in a similar fashion denies the role of conventional extramusical meanings; she claims that music, unlike language, has no culturally fixed denotations. For both of these authors, the intrinsic connections between musical sounds form the basis of musical meaning:

> "Music has a subject—i.e. a musical subject, which is no less a divine spark than the beautiful of any other art. Yet, only by steadfastly denying the existence of any other "subject" in music, is it possible to save its "true subject." The indefinite emotions which at best underlie the other kind of subject, do not explain its spiritual force...the untrammelled working of the human mind on material susceptible of intellectual manipulation."
>
> (Hanslick, 1974, p. 173)

> "Why then, is it (music) not a *language* of feeling...? Because its elements are not words—independent associative symbols with reference fixed by convention. Only as an articulate form is it found to fit anything; and since there is no meaning assigned to any of its parts, it lacks one of the basic characteristics of language—fixed association, and therewith a single unequivocal reference."
>
> (Langer, 1953, p. 31)

Neither Langer nor Hanslick deny the way in which music *resembles* the play of emotions; both recognise the emotive aspect of music, yet they insist that this aspect is the result of the similarity between the intrinsic structures of music and the structure of our emotive experiences. Here, Langer's debt to Hanslick becomes explicit: just as the latter suggests that music's similarity to emotional experience is at the level of music's "dynamic properties" expressed through "sound and motion" (Hanslick, 1974, p. 35), Langer suggests that music's emotive significance lies in its similarity to our experience of temporal flow and volume *à la* Bergson. The sounds of music seem to move and interrelate in a way that is congruent to the elements of our inner experiences (Langer, 1953). In this way, a musical aesthetic is proposed which preserves the ideology of musical 'purity', yet allows for music's emotional impact. The autonomy of musical structure is hence shown to be valid without a denial of the connections between musical and everyday experience, essential to explain why music occupies such a prominent place in our experiences. Indeed, Langer claims that it is precisely because of such autonomy that music is able to articulate aspects of our experience that cannot be expressed through language. In this way, the purity of music, its syntactical nature, becomes linked to the notion that music escapes from conventional, culturally circumscribed modes of reference.

Acousmatic music challenges this ideology at its root. Here, musical units often consist of sounds which have pre-existing, 'referential' meanings. Are we then to deny the musicality of such extrinsic reference? On the contrary; extrinsic significance is as "vital" a force in musical structure as the

that of music's intrinsic coherence. In order to show this, it is necessary to challenge the assertion that meaning in music relies upon a metaphorical relationship between abstract musical structures and the world.

1.3.3 Mimesis as metaphor

Composers, scientists and aestheticians tend to suggest that sounds 'behave' *as if* they had mass, velocity and the like. Helmholtz (1954) for example, suggests that pitch relationships can be described in terms of a spatial analogue, and that this analogy explains the ability of music to "express":

> "Such a close analogy consequently exists in all essential relations between the musical scale and space, that even alteration of pitch has a readily recognized and unmistakable resemblance to motion in space, and is often metaphorically termed the ascending or descending *motion* or *progression* of a part. Hence, again, it becomes possible for motion in music to imitate the peculiar characteristics of motive forces in space, that is to form an image of the various impulses and forces which lie at the root of motion. And on this, I believe, essentially depends the power of music to picture emotion"
>
> (Helmholtz, 1954, p. 370)

Such a view of musical motion as an analogical or *metaphorical* construct is vital to understanding the fuller implications of music as an autonomous yet meaningful form. Whilst Hanslick and Langer propose that it is musical structures themselves that resemble our everyday experiences neither proposes a theory that would explain why musical structures may be so wholly different from and yet expressive of non-musical experience. As Scruton notes, the logical conclusion of Hanslick's approach is that music itself cannot express anything at all:

> "It would seem to follow that an artistic medium which, like music, can neither represent objects nor convey specific thoughts about them is logically debarred from expressing emotion"
>
> (Scruton, 1983, p. 58)

If one is to argue along these lines then the belief that music expresses emotions and refers to events in the world, that it is meaningful in a

conventional sense, must be explained in some way. If, like Langer, one wishes to argue that musical structures resemble inner experiences, albeit in a non-referential, non-discursive fashion, then one is bound to explain how such resemblance is achieved. Such explanations are hinted at in both the writings of Hanslick and Langer in their reliance on the notion of musical space and musical motion.

> "...the elements of music are not tones of such and such pitch, duration and loudness, nor chords and measured beats; they are, like all artistic elements, something virtual, created only for perception. Edouard Hanslick denoted them rightly:...'sounding forms in motion'"
>
> (Langer, 1959, p. 107)

If, as Langer argues, musical motion and space merely resemble physical motion and space (Langer, 1959, p. 108), how is this resemblance achieved? For Scruton (1983) this question is crucial; if music cannot represent extrinsic events, whether emotions or objects, then what allows such semblance to occur? His solution, that such semblance occurs by virtue of metaphor, adopts a position similar to that of Helmholtz as quoted above. Musical structures do not move in space, yet the listener attributes such properties to the music, an intentional act:

> "Of course, we *hear* a chord as a single musical object: but that is the result of our musical understanding. It is not a feature of the 'spatial' distribution of sounds. Hence, in order to construe musical 'space' as analogous to physical space, we have to construe it, not materially, but intentionally, in terms of that very capacity for musical understanding we are trying to explain. It is a phenomenal fact about auditory space that it possesses the topological feature of orientation; but it is not a fact about sound, construed independently of the musical experiences of which it is the (material) object."
>
> (Scruton, 1983, p. 83)

This explains how sounds are simultaneously non-expressive yet construed as expressive: just as sounds may be described as low and high, a metaphorical movement from low to high could be heard as a gesture with some form of emotional content. The important feature of this view is that musical meaning is not merely an attribute of sound but of the metaphorical structures the

listener imposes upon sound. Hence, within this perspective, if music is in any way mimetic it achieves this through a process of metaphor: the resemblance between music and the world (real or emotional) is not accidental nor inexplicable, nor is it physical. It is important to note that Scruton, although giving an explanation of why a non-representational art-form might lead to metaphorical understanding, is only required to develop this theory as a method of escaping from the notion that music is at once wholly autonomous yet meaningful. As will be shown in the next section, however, music is not autonomous in the narrow sense assumed by Scruton, and maintains a relationship with the world that is rather more direct than assumed as the basis for his metaphorical view of musical expression.

1.3.4 Beyond metaphor

In view of such a deep-seated opposition to the idea of the extrinsic significance of musical sounds, it is not surprising that the role of mimesis in acousmatic music has been underestimated by many theorists and analysts (see section 1.2). If the only kinds of musical objects, motions and spaces are metaphorical, then it is tempting to treat the mimetic aspect of music as peripheral. The object of musical study, within such a view, is music itself, not its relationship to the world. The study of acousmatic music follows the same paradigms as are applied to traditional musical forms. For example, it is no accident that Schaeffer, in his attempts to reduce listening to an abstracted solfège (Schaeffer, 1966), uses such a traditional term to describe the basis of the musical 'language' to which he aspired. Despite the aural basis of his project, it is based upon the same denial of mimesis as part of musical discourse that can be found in the writings of Hanslick. Schaeffer, to his credit, does not deny the relationship between sounds and their sources, nor the pre-existing conventions which dominate our everyday contact with the acoustic environment. In this sense, however, it is all the more remarkable that

such extrinsic factors are excluded from his ideal of musical research. Similarly, the timbral research exemplified by Wessel (1979) and McAdams and Cunibile (1992) (see section 1.2.2) resembles the paradigms of research in tonality; "timbre space" like the pitch spaces and tonal maps of Shepard (1982) and Krumhansl (1983) depicts relationships between sounds without reference to their extrinsic significance. Such a reductive process is a recognised and valid scientific procedure, but it illustrates clearly the notion that it is the abstract nature of timbre, its value as a parameter, that should form the basis of musical research, rather than its role in identifying sources. Such research is not inappropriate in all circumstances, but the perspective illustrates the aversion to mimesis that is a defining feature of Western musical culture.

This aversion is in clear contradiction with the interest in mimesis displayed in the practices and explanatory discourses of many composers in the acousmatic field. Rather than viewing the pre-existent significance of sounds as an extra-musical concern, many composers see such matters as fundamental to the structure of their works. Moreover, the *relationship* between such 'found' meanings and the more abstract, or intrinsic, structure of their works is seen as a major issue. Rather than seeing mimesis as a force external to musical discourse, such commentators regard it as a fundamental aspect of their works' structures. This view, rather than being a radical departure within musical practice can be seen as having a hidden, yet ever-present history within Western art music. The notion that musical works have more than a metaphorical relationship to the external world, despite the dominance of self-referential views of musical structure, has been addressed in a number of ways in recent writing. Agawu (1991), for example, has observed the simultaneous operation of intrinsic and extrinsic forms of semiosis in the classical period; here, he argues, reference to rhetorical topics, an extrinsic body of culturally convened knowledge, exists side-by-side with

the intrinsic structures provided by the 'syntax' of voice-leading analyses. Indeed these two forms of significance are capable of dialogue in their potential for both parallel and conflicting organisation. Interestingly, however, the intrinsic structures are endowed by Agawu with greater importance through their potential for escaping from the historically mediated conventions which afflict the understanding of extrinsic codes. Whereas rhetorical topics no longer retain their immediacy for the listener, it is argued that the syntactical structures of the classical period are largely independent of such historical decay. Whatever the truth of this assertion, contemporary documents suggest that for audiences during the classical period, extrinsic reference played a large part in defining musical meaning. Whether the extrinsic references made by acousmatic music are as historically mediate should not be assumed from the outset. If one wishes to form a perceptual description of acousmatic music one must be wary of basing one's analytical framework upon the notion that intrinsic structures are less subject to historical mediation and hence of more value. It may be true that for the music of the classical period rhetorical topics have lost their immediacy; but it does not follow that this is a consequence of their extrinsic nature *per se*. What is certain is that the extrinsic references of acousmatic music must be examined within their own cultural and perceptual milieu if one is to avoid the danger of applying inappropriate analytical tools, based upon a particular historical process which has no necessary relevance. Agawu's research suggests, regardless of such limitations of genre, that coded, arbitrary relationships between sounds and their 'content' can form a vital part of musical understanding.

Such work shows that 'narrative' structures, based upon culturally convened extra-musical codes, may have a hidden history. Musical sounds may have a coded and arbitrary relationship with extra-musical units of content, and like all arbitrary signs, will be subject to diachronic changes resulting in their erosion over time. However, following this semiotic

approach it is clear that not all types of sign are equally subject to diachronic change. Taking Peirce's three types of sign, icons, indices and symbols (Peirce, 1991, pp. 239-240[12]), it is clear that indexical and iconic forms of semiosis may be equally important in defining extrinsic reference in music. For example, music may indexically signify the effort of the body that performs it, or bear some iconic resemblance to prosody in speech or emotive bodily gestures (see e.g. Clynes; 1977; Lidov, 1987[13]; Clarke, 1993). Whereas a *symbolic* system (as advanced by Saussure, 1983) rests upon the arbitrary relationships between units within a culturally convened system, iconic and indexical signs are not limited by such constraints. The perception of indexical, or causal, links between sounds and our surroundings will form the basis of the main arguments of this thesis. Note that it is in *indexical* signification that writers such as Monelle reconcile music's non-representational yet meaningful paradox (see e.g. Monelle, 1992, pp. 193-219[14]). In Chapter 2, the perceptual basis for such relationships will be examined, and will be shown to be compatible with a culturally mediate view of meaning and aesthetic perception. Signification through resemblance, through iconic signs, leads back to a metaphorical view of the relationship between sound and motion in space (see section 1.3.4). This kind of reference may be important in explaining some aspects of musical meaning relevant to acousmatic music, but it is the possibility of directly perceiving causal relationships between sounds and the environment which will be shown to define the types of mimesis central to a broader understanding of the acousmatic. Metaphorical relationships will form part of this explanation, but

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[12] An icon signifies through its resemblance to an object, an index through its causal relationship with an object and a symbol by virtue of cultural convention.

[13] In this paper, Lidov claims, for example, that "Anterior to its status as a sign, music is an action on and of the body" (p. 69) and that "In acquiring signs, sensations and impulses formed in and of the body transcend it to become mind" (p. 71).

[14] In a recent presentation to the Royal Musical Association entitled "Expression and indexicality" (King's College, London University, 1995) Monelle suggested that music's expressivity rested upon its status as an index of 'intersubjectivity', of which the 'object' was music, and the 'interpretant' emotion.

do not help us to escape from the view that music's resemblance to anything but itself is supplied by the listener, as argued by Scruton (1983; see above section 1.3.4). This thesis will attempt to locate the meaning of acousmatic discourse not only within the imagination of the listener, but in the relationship of the listener with his or her environment.

1.3.5 Mimesis in acousmatic music

There are some notable precursors to this view from within the field of acousmatic music. Although strongly influenced by the acousmatic tradition represented by Schaeffer, Smalley (1986) regards the mimetic attributes of sound as having a complex relationship with reduced listening. The recognition by listeners (and composers) of sounds' causation, whether real or apparent, is not to be ignored or relegated to supplementary status. Rather, it is seen as a primary force in the structure of acousmatic music, whether through metaphorical or more direct links with our environment. Sounds may have differing degrees of connection with their apparent sources, referring to them precisely or through a kind of family resemblance— a taxonomy of excitatory causes. Sounds are perceived not only to have detailed relationships with specific sound producing objects but also relationships with "surrogate" sources. The relationship between such extrinsic connections and the internal structure of pieces is a complex one in which timbre is neither regarded as fully independent of causation nor fully determined by it (Smalley; 1986; 1992; 1994). In a similar vein, Ten Hoopen (1994) claims that the relationship between source and cause operates along a continuum so that sounds may be more or less ambiguously identified as having a particular cause. In more ambiguous cases, the listener is forced into a metaphorical relationship with the sounds of a piece, whereas in cases where definite cause can be attributed the listener is brought into a rather more veridical frame of reference. This formulation neatly encapsulates the importance of mimesis in acousmatic

situations, and in a more radical form the tendency of listeners to ascribe causation, however vague, is central to this thesis. Both of these views seem to represent an interest in the force of source attribution, however vague, in providing the basis for intrinsic musical structure. Smalley's music and writings, however, do not explore the more obvious 'narrative' role of sounds in any depth, avoiding the rather more radical approach to mimesis, that is represented by the title of a recent article concerned with the 'story-telling' aspect of many tape compositions: "Telling Tales" (Norman, 1994). Norman offers the following starting point for an alternative discourse:

> "I'd like to abandon musical analogies and offer oral storytelling as a new—or rather, a very old—model for performance..."
>
> (Norman, 1994, p. 104)

Within this context, the notion of combining musical and narrative devices is a side-show; the tape piece provides possibilities which need not be developed from a musical perspective at all. This kind of explanatory discourse begins to dissolve the boundaries between musical and narrative discourse in a way which calls into question the appropriateness of musical models for describing the montages of real world sounds exemplified by composers such as Luc Ferrari. However, story-telling is only one aspect of such work: what is important is not to exclude such narrative processes from analytical descriptions. The incursion of clearly recognisable actuality recordings within acousmatic pieces shows the tension that exists between traditional views of musical structure and current practice just as much as the utilisation of digital and analog techniques for manipulating sounds challenges simplistic views of timbre through the concealment of familiar sources. Despite the surface differences between these two practices, there is no guarantee that listeners will not focus their attention upon the narrative provided by the attribution of sources to ambiguous sounds, nor that they will not focus upon the more abstract aspects of a clearly narrative structure. What is clear is that such

explanatory discourses reveal the importance of mimesis in acousmatic music, not as a supplement to traditional musical structure but as part and parcel of the structure of individual works. Such a view is reflected by Emmerson (1986), whose concern is the relationship between mimesis and various forms of more abstract structuring principles. This view will be returned to in Chapter 4, where his approach will be compared with the perspective developed in the intervening chapters of this thesis[15].

The writings and music of Trevor Wishart (e.g. 1986) seem to illustrate the middle-ground here. A piece such as *Red Bird* provides obvious narrative structure utilising the common connotations of sounds as the units in a political polemic whilst combining this narrative with subtle transformations which in addition to their narrative role become, in themselves the basis of intrinsic structure. Such transformations facilitate story-telling in that they form abstract connections between sounds which can be interpreted as having narrative significance. These narrative links conversely provide additional strength to the transformations themselves. The "abstract" and "concrete" aspects of sounds discussed by Smalley (1986), via subtle editing, interpolation and cross-fading, become intertwined. The opening of Wishart's work *Red Bird* **(music example 1.3)** is illustrative here. Are the connections between the familiar sounds we hear achieved by skilful timbral connections or by narrative? And more importantly to this thesis, does the listener focus upon the unity[16] of timbral relationships or upon the narrative suggested? It is clear that despite the problems of Wishart's writings as an analytical blueprint (see section 1.2.1) the subtle interpenetration of musical and narrative forms suggested in his writings *are* reflected in the music in an undeniable fashion. Hence, it may be argued that the mimetic aspect of music, obscured by the

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[15] Emmerson's other major concern in this article is the relationship between materials and "language". This concern is returned to in Chapter 4.

[16] No claims are made here about the supposition that unity is a necessary or defining feature of intrinsic musical structures.

praxis of Western music theory, is in a sense *reclaimed* by such relationships within acousmatic music.

1.4 Summary

Thus far, this thesis has concerned itself with the inadequacy of current approaches to forming descriptive analyses of acousmatic music and the grounds upon which such an inadequacy rests. Where the listener has been taken into account, perceptual research has been dominated by prescriptive goals that are embedded within the notion that music is primarily an abstract art-form. Where such an ideology has been abandoned or challenged, few efforts have been made to escape from this prescriptive bias. Rather than develop such efforts, this thesis will attempt to place acousmatic music within a broader debate that avoids complicity in any compositional or music-theoretical ideology. Although musical issues will be addressed, it is first necessary to jettison the idea that our traditional views of music are appropriate for forming analyses of acousmatic works. Rather than approaching such a project from the prescriptive perspective of Schaeffer (1966), whose methods imply the traditional boundaries of musical discourse, this thesis will take up a position outside these boundaries. An attempt will be made to understand the ways in which we listen to the world in general, and to observe acousmatic music from within this context. Only through questioning the boundaries of music, rather than positing them *a priori*, is it possible to appreciate fully that which distinguishes musical listening, or musical works, from other forms of listening or artefact. Hence, just as this thesis is an attempt to understand how one should describe acousmatic music, it is also an attempt to understand whether such a description entails a critique of the boundaries between aesthetic and general experiences. It is not just that a music-theoretical approach may be inappropriate to the study of acousmatic music but also that it may conceal ways in which acousmatic music reflects

broader aesthetic issues. Hence, from the outset, acousmatic music will not be seen in the light of its differences from and similarities to traditional musical discourse, but as something that is listened to. The relationship between such listening and our knowledge of other forms of music will not be pre-supposed. Undoubtedly, such links exist, but these links will not be seen to constitute the bases of our perceptions and interpretations. This thesis is not an attempt to replace music theory with music perception, but an attempt to locate the experience of acousmatic music within perception as a whole.

In place of music theory and current work in music perception that might seem relevant to acousmatic music, a theory of listening will be advanced, developed from the perceptual theories of Gibson (1966; 1979). This theory assumes no specialist knowledge of music, language or any other culturally convened system of signs, and takes as its starting point a direct and dynamic relationship between the listener and his or her environment. By observing the shortcomings of such a generalised theory of perception in explaining specific aspects of the perception of acousmatic music, a theory is developed that explicitly shows the relationship between general, or direct auditory perception, and the social and cultural mediation necessary for the aesthetic interpretation of sounds. Through this process the critical potential of acousmatic music is approached in its own terms, relative not only to traditional musical discourse but to listening as a whole. Hence, the discovery of the pertinent descriptive units of acousmatic music, their interpretation and relationships, is based upon the assumption that in order to understand the perception of 'musical' structure, it is first necessary to understand the perception of the extramusical world within which such specific structures are located.

Chapter 2

An ecological approach to acousmatic music

2.0 Introduction

In this chapter an approach to perception will be considered which forms the basis for a perceptual and descriptive approach to the analysis of acousmatic music, and which tackles the theoretical problems discussed in Chapter 1. This approach, largely based upon Gibson's "ecological" approach to perception (Gibson, 1966; 1979), presents its own difficulties, not least its concentration upon those aspects of perception that are not socially or culturally defined. Indeed, sections 2.2 and 2.3 of this chapter will comprise an attempt to apply Gibson's approach to the social and the aesthetic respectively. As these later sections show, Gibson's ideas can be used to relate perceptual descriptions and analyses of acousmatic music not only to the 'natural' environment, but also to the 'social' and 'cultural' environment.

Gibson's approach can be viewed as an alternative to the prevailing cognitive views of perception, and as an attempt to dismantle the dualism of mental representations of the world and reality, a view in which our perceptions are the result of mental processes that mediate between the sensory data available to our sense organs and what is perceived. This chapter will not attempt to enter into this argument more than is necessary: the ecological approach is advanced for its benefits in understanding auditory perception, and particularly aesthetic perception, rather than as a rival to cognitive psychology. An ecological approach, it will be argued, provides a level of description which places acousmatic music within a broader perceptual context than is provided by prevailing views of music perception or music theory. This ecological approach is not adopted as an alternative

explanation of perception, but as an alternative *description* of the structures which are relevant to a perceptually motivated analysis of acousmatic music.

2.1 Ecological acoustics and acousmatic music

2.1.0 The ecological approach to perception

According to Gibson (1966; 1979), perception does not require the mediation of mental representations of the external world. Rather than assuming that the sensations passed from the sense organs to the central nervous system represent a chaotic source of information that mental processes organise and store in the form of meaningful percepts and memories, an ecological approach assumes that the 'external' world, the environment, is structured and that organisms are directly sensitive to such structure. If this was the sum of Gibson's work accusations of naïve realism would be justified. How could such a view 'explain' the way in which human beings utilise language, mental imagery, knowledge and memories in their experience of the world? Merely stating that an organism is *sensitive* to environmental structure seems to beg too many questions. However, Gibson's work is much more subtle than this. He does not claim that memory, language and other symbolic systems play no role in our experience of the world. On the contrary, such systems to a large extent constitute that experience. However, Gibson is keen to distinguish between the experience of such structures and their role in perception (Gibson, 1979) and, for example, between perception and symbolic systems which facilitate the mediation of perceptions (Gibson, 1966; 1979; Reed, 1991). Within an ecological approach knowledge is not denied, but it is not explained as the storage or manipulation of representations.

2.1.1 Event perception

The core of Gibson's contribution lies in the way in which perception is seen as a continuous and mutual relationship between organism and environment. This relationship is expressed in both ontogenetic and phylogenetic terms: just as a species develops perceptual systems that are appropriate to its environment through natural selection, the individual organism's perceptual systems become progressively attuned to its particular environment through its developmental history. An organism evolves, both phylogenetically and ontogenetically, to *pick-up* information that will increase its chances of survival. It develops perceptual systems that enable it to perceive features of the environment that facilitate continued existence, and hence reproduction. Moreover, the dynamic relationship between a perceiving, acting organism and its environment is seen to provide the grounds for the direct perception of meaning. Gibson's term for this is "affordance". Objects and events are related to a perceiving organism by structured information, and they "afford" certain possibilities for action relative to an organism. For example, a cup affords drinking, the ground, walking. For different organisms, affordances will differ; for a human being an open body of water might afford swimming or immersion, but for a water bug the same stimulus information, picked up by different perceptual systems and relative to different organismic structure, would afford support (Gibson, 1979, p. 127). Moreover, affordances are fluid relative to individual perceptual development: for a surfer, certain patterns of waves afford surfing, whilst to a non-surfer they might afford drowning. Affordances, "point both ways" (Gibson, 1979, p. 129) in that they can neither be explained purely in terms of the needs of the organism, nor in terms of the objective features of the environment. The affordance is a relationship between a particular environmental structure and a particular organism's needs and capacities.

As each organism, or species, evolves it will develop certain effectivities, possible actions, and its perception of an environment will reflect those features of an environment that allow for or demand organismic actions. Conversely, as an environment develops it will offer certain affordances, features of survival value to an organism. An organism can be said to exhibit an effectivity structure, a complex of actions that reflect its relationship to the affordance structure of an environment. This perspective may seem circular, but it allows for a view of perception that avoids the problem of infinite regress. Internal representations of an external reality beg the question of who, or what, perceives such a representation, and who or what perceives the representation of the representation (see Shaw and Turvey, 1981).

Event perception attempts to identify the *invariant* properties of events that specify permanent and changing features of the environment that are significant to an organism. The aims of this approach are neatly encapsulated by Shaw, McIntyre and Mace (1974, p. 280):

> "By analyzing the organism's context of physical stimulation into events with adaptive significance, we have a means of conceptually distilling from the ambient flux of stimulation those aspects most relevant to the maintenance of equilibration in the organism's ecosystem."

Any event will be perceived in terms of its affordance structure, its potential to evoke adaptive behaviour. The affordance structure of an event will vary according to the particular effectivities of an organism, its potential for performing adaptive behaviour. The properties of events that make up a particular affordance structure are termed invariants, and may be divided up into two classes, those that specify styles of change and those that specify persistence, or permanence (Warren and Shaw, 1985). An event can be defined as a process that leaves some physical properties unchanged and transforms others. The identification of the styles of change and persistent features of events that are ecologically significant is a primary motive in studying event perception. Following Gibson (1966; 1979), styles of change

and permanent features are examined in terms of their invariant structure. For example, the perception of facial growth seems to be the result of specific geometrical functions that transform certain elements of facial structure whilst leaving others permanent (Shaw, McIntyre and Mace, 1974; Mark, Todd and Shaw, 1981). Such geometrical functions can be termed transformational invariants, whilst those features left unchanged can be termed structural invariants. As Warren and Shaw (1985, p. 6) point out, permanence and change can only be differentiated reciprocally and with reference to the observer. Moreover, the difference between permanence and change depends upon the temporal perspective of the organism involved:

> "The bright orange-leaf that is transient for us is a permanent fixture for the 24-hour life span of the insect that lands upon it, and the mountainside that appears to us eternal will, in time, be levelled by erosion."
>
> (Warren and Shaw, 1985, p. 6)

Shaw, McIntyre and Mace (1974) have termed the ecological significance of an invariant its "attensity". The particular invariant properties of an event that make up an affordance structure will vary in attensity according to the particular adaptive relationship of a particular organism to its environment at a particular time. In summary, events can be described in terms of their adaptive significance to an organism, and are the result of the coevolution of the perceptual systems of organism and an environment. Within such a perspective, an event's 'meaning' is determined directly, not by mental processes or representation: an event produces structured information that affords further perception or action.

2.1.2 Auditory event perception: an ecological acoustics

In order to explain more clearly how the environment makes available structured information, invariances, examples will be offered from research in auditory perception. Gibson's discussion of invariances is largely dominated by the visual domain (Gibson, 1979), despite some preliminary work on

audition (Gibson, 1966). As the concern here is with a primarily auditory phenomenon, it seems reasonable to move straight to work in audition, although other sources of information will prove relevant when we return to the 'acousmatic' listening context itself. Moreover, the research cited will betray a concentration (maintained throughout this thesis) upon invariants that specify sound producing objects, leaving aside work upon sound localisation, the perception of distance (e.g. Shaw, McGowan and Turvey, 1991) and other areas relevant to the perception of the 'layout' and segmentation of the acoustic environment (e.g. Bregman, 1990). The motivation for adopting an ecological approach in this context is to redress the balance between abstract approaches to musical structure and those that take into account the connections between sounds and the environment. Although the perception of the spatial layout and segregation of events *could* be included within such a project, this thesis will concentrate upon the way that the structured nature of auditory information specifies particular environmental events and classes of events. As will be shown, this is sufficient to challenge the assumptions made by existing theorists.

Heine and Guski (1991) point out that although research in "ecological acoustics" is as yet an underdeveloped area within ecological psychology, the concern with studying real sounds in realistic situations has a considerable history. Just as Gibson's research in vision rests upon empirical research which allows the subject access to experimental materials and paradigms which resemble realistic situations, a number of studies have, without explicitly adopting an ecological stance, implicitly applied experimental paradigms which recognise the possibility that controlling experimental variables can lead to results which bear little resemblance to perception in a more realistic setting. Hence, before reviewing explicitly Gibsonian work, some of these studies will be addressed in order to illustrate the broader implications of studying the perception of "everyday sounds" (Heine and

Guski, 1991). All of these studies, to some degree, expose the way in which sounds provide information about events.

Much of the literature which deals with perceiving sounds in realistic situations comes from research in sonar recognition. In order to isolate acoustic features that human sonar operators depend upon to determine the source of a sonar trace, one has to take into account both the variations in acoustic information available to an operator and the resulting percepts. A fundamental issue here is to identify those features which contribute to the identification of particular sources, such as those that determine the perception of a particular size or type of ship. One experimental approach to such a task would be to isolate particular acoustic variables available to sonar operators and to determine which variables, and under which conditions, give rise to the perception of differing qualities and types of shipping. This approach, however, based upon the reductive and controlled experimental procedures of conventional psychological investigation, has serious shortcomings. Firstly, one could waste considerable effort presenting subjects with irrelevant variables before discovering any useful findings. Secondly, and more fundamentally, one cannot be sure that the isolated variables that are presented will give rise to similar perceptual results as those that exist in a realistic context. Sonar information is highly complex and noisy, and it is possible that within such a context variables interact in some way that a reductive experiment could not predict. These problems led Solomon (1958; 1959a & b) to take account of the particular relationship of sonar operators, their "frame of reference" (1958, p. 422), in his research. Noting that sonar operators tend to categorise sounds using a specialised vocabulary, Solomon employed factor analysis of ratings along continua between adjectives to discover the perceptual similarity of real sonar sounds (1958) and was thus able to determine which sounds were perceived as having similar 'meaning' within the context of sonar operation. Those sounds that were perceived similarly

were then analysed to discover their acoustic commonalities (1959a & b). This form of research has led to the possibility of modelling the perceptual tasks of the sonar operator (e. g. Howard and Ballas, 1983) with great success. It succeeds because it allows for the possibility that complex sounds are perceived according to the context provided by the organism that perceives them, and because the use of subjective scaling reduces the wastage entailed by more conventional methods.

The problem with factor analysis of adjective ratings is that the results necessarily reflect the experimenters' choice of adjective pairs. Where a pre-existing vocabulary of adjectives, produced by a population in response to a pragmatic goal can be utilised, this problem is minimised— especially where a clear task is defined. For example, the classification of sonar sounds by sonar operators is required for a particular purpose: the identification of ships. The adjectives used by sonar operators to describe such sounds can be assumed to reflect the processes involved in a task with which they are familiar and skilled (see Solomon, 1958). However, if one uses such methods for more general perceptual tasks one runs the risk of accepting a descriptive terminology unfamiliar to subjects, an unfamiliar task, or both. The adjective pairs adopted by experimenters in such circumstances may reflect the perceptual variables that the researchers hope to find salient, and may bear little relation to the unconstrained categorisation subjects might adopt. Hence, the correlation of linguistic descriptors and acoustic parameters may fail truly to reflect the similarities perceived by subjects. Multidimensional scaling approaches sometimes attempt to avoid this problem by simply recording similarity judgements between stimuli and then attempting to find acoustic correlates (e.g. Howard and Silverman, 1976). This approach also has drawbacks, as one must assume that the acoustic correlates measured, rather than those ignored, account for the similarity judgements. This is again similar to the reductionist experimental paradigm, limited by those variables chosen

for analysis and isolated for presentation. Moreover, although multidimensional scaling (MDS) can avoid the oversimplification of complex stimuli it still begs questions regarding the choice of variables observed. For example, studies of instrumental timbre perception using MDS (e.g. Grey, 1977; Grey and Gordon, 1978) have assumed from the outset that timbre is a discrete perceptual attribute, and that the judgements of similarity between events differing, for example, in amplitude envelope, spectral energy distribution, and the pattern of spectral distribution over time have some significance in explaining listeners' perception of sounds in situations outside the laboratory. Indeed, as noted in Chapter 1, Grey himself is quick to point out that the resulting three dimensional map of 'timbres' is just as much a map of instrumental families.

The studies addressed above are mainly concerned with non-temporal relationships between sounds. Howard and Ballas (1980; 1982) performed a series of experiments which aimed to address the perception of acoustic categories in sequences of pure tones and complex everyday sounds. In the first of these studies (Howard and Ballas, 1980) they presented short sequences of sounds which were either (i) generated in accordance with a finite state grammar; (ii) of equivalent length, but "ungrammatical"; or (iii) "noise" sequences which were randomly constructed. The elements in the sequences were either a set of pure tones, or a set of everyday complex sounds. Subjects had to distinguish, both with feedback and without, between grammatical and non-grammatical sequences. Although syntactical structure played an undeniable role in distinguishing between targets and non-targets, this effect was diminished where everyday sounds were employed, unless subjects were explicitly informed about the "semantic" relationship between these sounds. The results clearly show that the classification of auditory patterns relies upon both syntactical and semantic factors: everyday sounds cannot be regarded as being structurally equivalent to pure tones. Moreover in

a second study (Howard and Ballas, 1982), it was confirmed that syntactical structures were more easily differentiated from non-syntactical patterns when the patterns employed familiar everyday sounds as opposed to pure tones. Two conclusions can be drawn: everyday sounds suggest their own structural relationships which may *conflict* with an 'abstract' syntactical structure imposed upon them. Secondly, sequences of everyday sounds may actually *improve* the acquisition of such abstract structures by providing "familiar scenarios" (Howard and Ballas, 1980, p. 439) within which to perceive sequential structure. This suggests that any attempt to observe the perception of complex familiar sounds cannot ignore their links with the environment and assume that such factors play no role in the perception of higher order temporal relationships. Although Howard and Ballas (1980; 1982) do not interpret these results within an ecological framework, such results are clearly consistent with notions of direct perception.

Howard and Ballas' work suggests that the perception of sound sources may play a role not just in determining the classification of source events, but in the pick-up of higher-order relationships between sounds:

> "...the order of transient components within a pattern is not arbitrary, but rather reflects the temporal structure of the generating events. In an everyday example, one would expect to hear the garage door open before hearing the car being driven out. On the other hand, a car door opening could either precede or follow the sound of the engine being shut off. Although the temporal or syntactic structure which exists in patterns of this sort is clearly less rigid and well specified than that encountered in the grammars of language, some temporal structure does exist."
>
> (Howard and Ballas, 1982, p. 158)

This illustrates how important it is that an attempt is made to understand the invariant structures that specify source events since these not only identify *what* we are hearing at the level of individual sources, but may also determine the structural *relationships* between sounds perceived through such information.

The ecological approach provides a method for ascertaining the relationship between acoustic structures and perceived events which avoids many of the limitations of factor analysis and MDS through presenting realistic auditory stimulus information and attempting to find "existing connections between acoustic invariances and actions of humans" (Heine & Guski, 1991). Although research in this area is sparse, and often falls short of making the connection between perception and action in explicit terms, some degree of success has been achieved. Whereas psychoacousticians tend to focus upon noticeable differences in pitch, spectral structure, or duration, such research attempts to identify the transformations in acoustic structure which inform the listener of some change in the environment. For example, Warren and Verbrugge (1984) discovered that the distinction between "breaking" and "bouncing" glass is made by subjects on the basis of specific temporal invariants, rather than any frequency information. Although the noise burst that occurs at the start of the sound of a breaking bottle is absent in the case of bouncing, removing this spectral information has little effect on the discrimination of these two types of event. It seemed that the only information necessary for the discrimination of breaking and bouncing lies in their higher order temporal structures (see figure 2.1). In order to test this hypothesis, they constructed synthetic 'breaking' and 'bouncing' events which consisted of series of glass impact samples varying only in the temporal relationships between each sample, over four channels: this information alone was sufficient for subjects to distinguish between the two classes of event. As one can see from the figure, this temporal information consisted in the first instance (a) of a single pulse train with a damped period and in the second instance (b) of a synchronised onset followed by asynchronous damped pulse trains. These invariants are lawfully related to the events that produce them. In the first case a single object repeatedly impacts with a surface with a decreasing period due to the conversion of kinetic energy into, amongst other

things, sound. In the second case, a single object impacts with a surface and breaks. Subsequently, the parts of that object follow the temporal patterns of bouncing objects, each with different physical structures and hence different damping functions. Each of these parallel temporal structures is identified as coming from an originally unified source by the onset synchrony of the event as a whole.

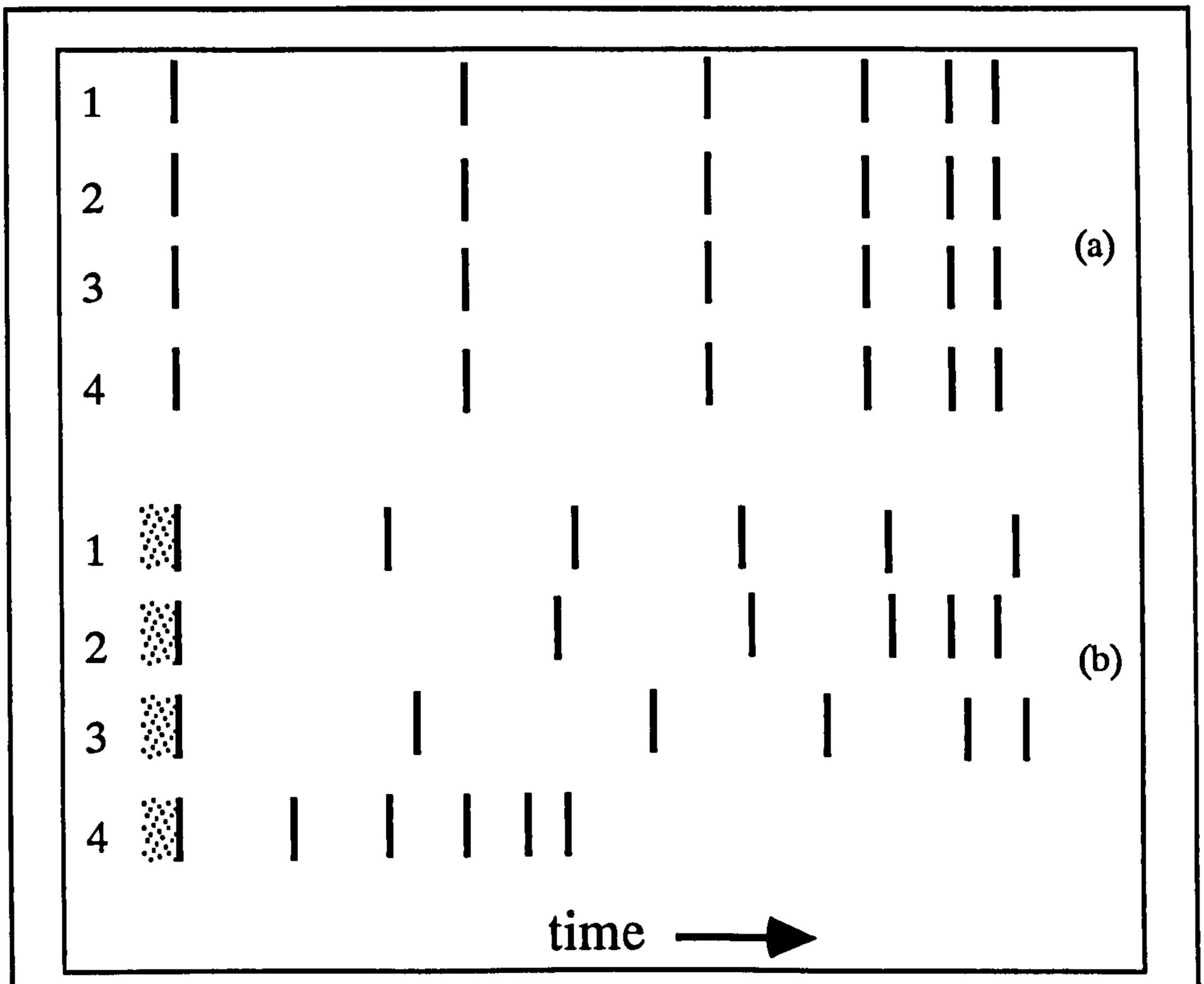

Figure 2.1 A schematic representation of the synthesised bouncing (a) and breaking (b) patterns used in Warren & Verbrugge (1984). Each pattern consisted of the four numbered channels of glass-impact samples. The onset noise originally included in the breaking pattern is shown. Based on Warren & Verbrugge (1984), Figure 3, p. 708. Copyright permission obtained.

It must be noted that the changes in inter-onset time and overall organisation of these patterns are specified by the physical nature of the event; it is hence possible to synthesise convincing virtual breaks and bounces by starting from a mechanical description of the masses, densities, elasticities and forces

involved in such an event. In this sense Warren and Verbrugge (1984) are involved in what might be described quite accurately as an "ecological" acoustics: certain invariant properties of the sound are directly and lawfully related to the physical properties of the causal event, and it is this lawfulness which specifies the event for the perceiver:

> "sound in isolation permits accurate identification of classes of sound producing events when the temporal structure of the sound is specific to the mechanical activity of the source"
>
> (Warren and Verbrugge, 1984, p. 705)

Only certain invariants are necessary for such specificity, in this case, time relationships. It is only by performing experiments of this kind that such invariants can be identified and distinguished from acoustic structures that play no necessary perceptual role.

A related study (Warren, Kim and Husney, 1987) provided even more startling evidence for the role of higher order structure in auditory perception and its lawful relationship with the physical properties of events. It would seem that the elasticity of balls can be as successfully perceived and acted upon when subjects hear a single bounce period (the period between two bounces of the ball), *relative* period being completely superfluous. The interesting feature of this experiment is that according to purely physical principles the duration of a single bounce is not as accurate a predictor of elasticity as a more complex variable such as the relative period of a number of bounces, as it varies according to starting height as well as elasticity. The research suggests that the most likely reason for this is that for "ecologically reasonable" values of elasticity the correlation with a single bounce duration is close enough to give accurate judgement. Moreover, this work on temporal invariances (see also Spelke 1976; 1979) has shown that such invariants, whether as information for the elasticity of bouncing balls or as information for correctly synchronising optical and acoustical patterns of events, can often be seen as intermodal, as operating across two or more modalities. In the first

study, for example, it was found that the temporal structure of the impacts of bouncing balls specified their relative elasticity regardless of whether the temporal information was made available in the auditory or visual domain. In both cases the visual and auditory information can be regarded as specifying elasticity due to the relationship between the temporal structure of a mechanical event and the temporal structure of the period between impacts of an object. It is clear from this research that a *lawful* relationship obtains between the physical structure of such events and the acoustic or visual information available to the organism. This relationship is not physical, nor is it imposed by the organism: rather it is picked up through our contact with the lawful behaviour of environmental events, and hence can be described as specifying such events *directly*.

In a similar vein Repp (1987) and Freed (1990) have searched for other acoustic properties which specify events lawfully. Freed (1990) investigated the possible acoustical correlates of "perceived mallet hardness" using real mallet sounds. Here, subjects were able to perceive mallet hardness independently of the attributes of the object being struck to make an "environment-oriented judgement". The reliable judgements of mallet hardness could be predicted on the basis of the spectral energy distribution of the different mallet sounds. Here, spectral invariants seem to specify the interaction of materials according to the physical nature of the event. Similarly, Repp (1987) discovered that hand claps are consistently yet incorrectly categorised by gender. Although classifications into male and female clappers are consistent across subjects they do not reliably predict gender, rather they predict the physical configuration of the hands and the tempo and intensity of the clapping. Low frequencies in the spectra seemed to correlate with palm to palm clapping; high frequencies with palm to fingers. The perception of gender differences seemed to rely upon the classification of higher, softer, faster claps as being female, according to a cultural stereotype.

One must interpret this as providing evidence for lawful and invariant relationships between physical actions and judgements of causation, rather than the matching of stored representations of 'male' and 'female' clapping sounds with acoustic stimuli.

The analysis of the free categorisation of environmental events gives considerable credence to the hypothesis that, in everyday situations, it is more often the physical nature of an event that is perceived than the abstract sensory qualities of the sound produced (Vanderveer, 1979; Jenkins, 1984; Gaver, 1993). Sounds are produced by events in the world, and the acoustical structure picked up by the listener contains invariant information that specifies the kind of event producing a particular sound. Events are lawfully related to their causes, and it is these lawful relationships that are perceived through structured and invariant information. We need not reconstruct or represent the causes that lead to a particular event, as our perceptual systems have evolved in an environment that behaves lawfully: a vibrating object produces sound waves that are related to the size, composition and shape of that object and the amount of energy applied, and the interactions between objects produce sound waves related directly to their individual physical characteristics and the mode of interaction. Any sound is the result of energy being transferred from a radiating body to a transmitting medium, and as the auditory system has evolved as a survival-driven interface with the environment it is the causal qualities of events that listeners will perceive. As Kendall notes:

> "In everyday life, sound events arise from action, in fact, from the transfer of energy to a sounding object. The auditory system provides us with perceptual characterizations of the energy transfer and of the internal structure of the objects involved. Early in childhood one learns to recognize the occurrence of sound events and to relate them to physical events..."
>
> (Kendall, 1991, p. 71)

Moreover, sounds, as Gibson would assert, do not identify their causes, or signify them, they specify events or objects that *afford*. For example, striking an object may produce a sound that informs the perceiver

that the object affords "filling" due to invariant properties that specify an affordance structure of "hollowness". In this case structured auditory information specifies not only that the object is hollow, but that it might afford the carrying of water or some other fluid, just as the perception of the elasticity of a bouncing ball might tell us that the ball affords 'catching' as it allows the catcher to predict how high that ball will bounce given a certain input of energy (Warren, Kim and Husney, 1987). The links between structured perceptual information and the organisation of action are in these cases embedded within the larger context provided by the mutual relationships between organism and environment. Such links are direct, in the sense that they exist by virtue of relationships between action and perception that are not arbitrary in nature; they are not constructed by the organism, but *discovered* through that organism's exploration of the environment. This is not to say that a listener may not, through extended transactions with such structure, learn to perceive new affordances, or that such affordances may become more detailed and specific. However, it suggests that perceptual development does not depend upon *providing* such structure; such structure already exists in the relationship between a human organism and its environment. Sounds provide direct awareness of the ways in which particular objects may be acted upon, and the results of such actions. The transformational invariants which specify a bottle breaking (see Warren and Verbrugge, 1984) also specify its change in morphology. More importantly than specifying such a change is the relationship this specifies for the listener. The transformation of one fillable object into a number of un-fillable fragments precludes that object's potential as a fluid-carrying vessel. A change in structure is not behaviourally neutral: the affordance structure has changed, and this change may be directly specified by the event perceived. In this sense it is misleading to portray the perception of 'breaking' as some ecologically neutral *classification* of this event. It is perceived in so far as it changes the relationship between listener

and environment: the bottle no longer affords filling. Within this perspective, the knowledge that the bottle is 'broken' does not explain why we do not attempt subsequently to fill it with water and drink from it. We might describe the bottle as broken in order to *communicate* this change in structure and its behavioural consequences, but such a labelling cannot explain our actions. The representation of an object as broken, and hence useless for its task, relies precisely upon a change in its affordance structure which is available to the listener regardless of such explicit labelling.

Additional support for the hypothesis that the structure of events is lawfully related to auditory perception is to be found in the modelling of natural sounds according to the physical properties of their causal events. Gaver (1992) has demonstrated the success of using physical models of vibration, and single and multiple collisions between objects, for synthesising the contrasting sounds of scraping surfaces and hitting wooden or metal objects. Other approaches, such as that of Claude Cadoz (e.g. Cadoz, Luciani & Florens, 1984; Cadoz, Lisowski & Florens, 1990) at the *Association pour la Création at la Recherche sur les Outils d'Expression* (ACROE) in Grenoble exploit the explicitly ecological notion of directly linking synthesis algorithms based upon physical models of objects or instruments with gesture transducers. These links are direct in the sense that the player of such a virtual instrument has a degree of tactile and auditory feedback that relates in an ecologically reasonable way to the gestures he or she makes. The model not only produces sounds according to a model of a string, but also generates haptic and acoustic feedback according to the model in the form of the forces involved in a 'virtual' interaction between 'string', 'bow' and the energy input from the 'player'. Such models explicitly rely upon the directness of event perception and the way in which perception and action reciprocate one another.

Such research has led Gaver (1992; 1993; personal communication) to propose that both synthetic and real events may be perceived in terms of their probable causation, whether or not this causation is *actual.* A real source is not necessary for the perception of a physical cause. Since the invariant structures which specify a particular event may be modelled, presented and controlled in synthesised sounds, it is clear that the notion of causal correspondence is of limited importance: although events are specified by certain invariants this is not to say that these invariants have to be produced by any *actual* physical interaction of materials. It would be absurd to argue that controlling an algorithmic 'string' via a gesture transducer relies upon the perception of a causal relationship between player, 'bow' and 'string' in any physical sense. Rather it is the transaction between player and a set of familiar invariant haptic and auditory structures which forms the link between action and perception. In the following section the consequences of this will be shown to be extremely important to the relationship between sounds and their perceived sources in acousmatic music.

In summary, the view presented here is that the auditory system has evolved to pick up environmental features that allow the organism to perceive those structures that are lawfully governed by the physical properties of sound sources and types of sound-generating interaction: *event perception.* Moreover, such sensitivity to sounds as information for events, in the light of work on the sequential structure of complex sounds (Howard and Ballas, 1980; 1982), cannot be regarded as independent from the perception of longer term structures. Before discussing the relevance of this perspective for describing and analysing the perception of acousmatic music, however, it must again be noted that the research cited does not represent a complete ecological theory of audition. As discussed above, no mention has been made of work in sound localisation or judgements of distance. Similarly, a discussion of the factors involved in auditory scene analysis (see Bregman,

1990), the segregation of acoustic information into discrete auditory 'streams', has been avoided, even though the latter could be seen as playing a large role in developing descriptions and analyses of acousmatic music which have perceptual veracity (see e.g. McAdams, 1984; McAdams and Bregman, 1979). The development of research in auditory streaming is seen here as a parallel project to this one as it tells us little about the *specificity* of event perception. It is one thing to develop a method of segmenting acoustic information, quite another to describe what information these auditory streams provide about their sources' structure. Indeed it is common to distinguish within such work between *schematic* and *primitive* processes in segregation, those that depend upon knowledge-driven processes, and those that proceed without the intervention of memory and learning (Bregman, 1990). Within an ecological perspective such a distinction is meaningless: all perceptual processes are determined by the relationship between organism and environment, and learning is regarded as the *refinement* of sensitivity to invariants (Gibson, 1966). Work in scene analysis tends implicitly or explicitly to maintain a distinction between perception and cognition and suggest that the latter, by relating sense-data to stored representations *explains* our ability to perceive the relationship between sounds and their corresponding events. This entails a perspective in which the lawfulness of event perception is ignored: the extremely artificial nature of the stimulus information generally used in scene analysis research tacitly denies the importance of higher order structure in complex acoustic information in the segregation or classification of everyday sounds. Throughout this thesis it will be assumed that scene analysis occurs in listening, just as it will be assumed that listeners may attend to different aspects of acoustic information. Whether or not a more ecologically based description of these processes can be developed is not a primary concern here. What will prove important is not the segmentation or localisation of sources within a complex acoustic "signal", but the way in which higher order

acoustic invariances specify physical interactions. This view of auditory perception is not a complete one, but serves the purpose of addressing the kinds of auditory information available to us from our immediate surroundings. Such information is not more 'complex' than the steady state tones and noise-bursts studied by psychoacousticians as long as it is described at an appropriate level, that of the structural and transformational invariants which have some relevance to everyday human behaviour. What is required in this context is to clarify the appropriateness of such descriptions to acousmatic music. Already, however, it has been shown that an ecological approach to auditory perception explicitly acknowledges the relationship between listener and environment and hence between acoustic information and the perception of events.

2.1.3 Event perception in acousmatic music

According to the view of auditory perception presented above, sounds are not perceived as abstract entities related only one to another, as 'tone colours' or timbres, nor are they perceived as standing for concepts or things, as signs. Instead they provide unmediated contact between listener and significant environmental occurrences. Such a perspective does not imply that sounds cannot be described as having 'qualities' such as those provided by Schaeffer (1966) or that they cannot be used as signs, whether culturally convened or more directly motivated. It does imply, nevertheless, that such mediated concepts are unnecessary for sounds to inform us about our environment. In an ecological framework, sounds provide an organism with information that allows it to locate, identify and successfully interact with food sources, predators, or members of its own species with which it may mate, collaborate or challenge for territory.

Such an approach may seem at first peculiarly unsuited to describing the perception of music. However, as will become clear, acousmatic music,

due to its acoustic structures, benefits from exploring this most direct level of perception. Gaver (1993) notes that the concentration upon 'musical' sounds in acoustics, psychoacoustics, and latterly music perception, can be seen as a primary factor in our "ignorance" regarding "everyday listening":

> "...an account of hearing based on the sounds and perceptions of musical instruments often seems biased and difficult to generalise. Musical sounds are not representative of the range of sounds we normally hear. Most musical sounds are harmonic; most everyday sounds inharmonic or noisy. Musical sounds tend to have a smooth, relatively simple temporal evolution; everyday sounds tend to be much more complex. Musical sounds seem to reveal little about their sources; while everyday sounds often provide a great deal of information about theirs. Finally, musical instruments afford changes of the sounds they make along relatively uninformative dimensions such as pitch or loudness, while everyday events involve many more kinds of changes—changes that are often musically useless but pragmatically important. Our current knowledge about sound and hearing has been deeply influenced by the study of a rather idiosyncratic subset of sounds and sources."
>
> (Gaver, 1993, p. 3)

If Gaver means *traditional* musical sounds in the above quotation, as one must assume he does, then what about the use of noisy, unpitched, inharmonic, source identifying sounds utilised by acousmatic composers? The materials of the acousmatic composer are often precisely those sounds excluded from a traditional view of musical sounds and sources. More importantly, it is these non-musical sounds and sources which are perceived by listeners: the parameters of pitch and rhythm are often hard to find in acousmatic music, and instrumental and vocal sources no more likely than the sounds of the everyday environment. Clearly, Gaver is correct to admonish research in auditory perception which ignores everyday sounds. Equally, however, it is clear that such criticism must also be levelled at research in *music* perception which fails to act upon the changes in the nature of the acoustic structure of music represented by acousmatic composition. Applying research based upon "the sounds and perceptions of musical instruments" to acousmatic music is as

biased and inappropriate as applying it to everyday listening[1]. Gaver's description of the distinction between musical and everyday sounds, despite his assertion that noisy sounds and pragmatic listening have no musical role to play, could almost be translated into a description of the distinction between the sounds of traditional and acousmatic music. Similarly, when Jenkins (1984, pp. 129-132) notes that "Music seems to belong in a space or world of its own" and emphasises "the special status that music may have in the realm of acoustic events" he is quick to discriminate between "sound effects" which often rely upon contact with the more familiar 'everyday' world and perception in such a specialised context as music. Within this context acousmatic music seems often to resemble the practice of sound effects in radio broadcast more than it does conventional music.

Before attempting to show how an ecological approach may be used to form the basis for describing and analysing acousmatic music, Balzano's ecological description of pitch structure (Balzano, 1980; 1882; 1986) must be addressed as it shows the necessity of describing musical structures in appropriate terms. Balzano attempts to find a "level of description" for pitch structure based not upon the structure of individual tones or interval relationships, but in the structured pitch sets that form the basis of much instrumental and vocal music. The important implication of Balzano's work is not his decision to do this, but the reasoning that lies behind this decision. Choosing an appropriate level of structural description is of benefit here because for most music

> "Streams of pitches arrayed over time that do not generate a determinate pitch set, such as the intonation contours of normal

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[1] Moreover, there is no reason to assume that an 'everyday' account of listening has nothing to offer in explaining the perception of traditional instrumental music. Davidson (1993) has found remarkable evidence for the intermodal perception of expressive "intentions" in instrumental performance which suggest that the movements of the performer's body are directly specified by visual invariants and that these invariants are just as informative of musical structure as are changes in the auditory signal. Indeed, it has been further suggested (Todd, Clarke and Davidson, 1993) that such intermodality may be the result of the movements of the peformer being directly linked with the patterns of tempo fluctuation which seem to correspond to the 'phrasing' of the music.

> human speech, do not normally elicit a state of the listener commonly associated with perceiving music."
>
> (Balzano, 1982, p. 321)

Balzano assumes that structured pitch sets, more commonly known as scales, may have properties that are independent from descriptions of their constituent *acoustic* elements, or frequency ratios between elements. This assumption, although inappropriate to acousmatic music, rests upon the same reasoning which motivates this project: acoustic information is structured and informative but since such structure only becomes transparent at particular levels of description, a major concern must be isolating such a level. Just as studying the frequency ratios or harmonic spectra of sounds may be inappropriate for discovering invariances in the structure of scale-based music, indeed too fine-grained for such analysis, expecting to find in the rhythmic or frequency structure of acousmatic music an appropriate level of description seems absurd. Likewise, research in timbre seems more concerned with prescribing musical practice than describing it. Viewing the practice of acousmatic music as leading to an increase in musical complexity, driven by the finer and finer grain control over musical materials available to the composer, seems to encourage research which attempts to control this apparent complexity at the most detailed level. Faced by an infinite palette of potential timbres and infinite gradations of frequency and time, the question posed seems to be one of finding appropriate ways of structuring such continuous variables (e.g. Wessel, 1979). However, there is no reason to require perceptual and music-analytical research to follow such prescriptions. What seems more important is to recognise that many of these infinitely variable sounds, and their combinations, seem remarkably familiar in everyday terms. The sounds may have been recontextualised, processed or generated by a synthesis algorithm, but to ignore the human perceptual system's ability to perceive the higher order structures of the everyday

acoustic environment through such sounds would be to ignore the direct way in which our everyday perceptions normally connect us with the world.

Although the appropriateness of choosing an everyday level of description may seem to have its most obvious benefits for understanding the use of recorded 'concrete' sounds in acousmatic music, this thesis proposes more than this. A concrete sound may be edited or processed in such a way as to conceal its original source, just as a synthetic sound, with no corresponding environmental cause, may specify an unambiguous 'surrogate' environmental origin. Moreover, such matters may or may not be under compositional control. Just as a composer might attempt for example to exclude any connections between his or her piece and familiar events whilst a listener might still hear such connections, whether or not these are veridical, so also a composer's intentional 'narrative' of familiar sounds might be misapprehended where a listener fails to perceive the 'correct' sound sources. Just as physical models of sound-producing events may create virtual instruments and events (see above, section 2.1.2) through modelling invariant acoustic information, such invariances may be perceived regardless of their actual causation.

This discussion can be clarified by a distinction between *real* and *virtual* events. Both real and virtual events are specified in the same way, by acoustic invariances that are lawfully related to the physical interactions that produce sound. In the latter case of virtual events, however, perception is not veridical: the listener hears an event that has not occurred. In a sense all the events of an acousmatic piece are virtual, since they do not inform the listener about his or her real environment. An acousmatic piece destroys the direct and continuous relationship between acoustic invariants and the surroundings of the listener through its fixed artefactual nature. Although one can 'explore' such a piece through repeated listening, and by interrupting the flow of the piece using a tape recording or other device, one cannot do much more than

this to 'explore' the acoustic scene, due to the mediation of recording technology. Moreover, the acousmatic piece prevents the listener from exploring the environment in an intermodal fashion: the 'acousmatic' (Schaeffer, 1966) prevents the listener from using his or her other perceptual systems (vision, touch, smell, taste), and intimately relating the events perceived with one's actions. Neither are the sounds of an acousmatic piece directly relevant to the listener: the sounds clearly originate from a number of loudspeakers, and despite all the efforts of research in modelling spatial perception (see e.g. Kistler and Wightman, 1992) one cannot forget that a listener to an acousmatic piece is already inhabiting an environment within which an impoverished 'virtual' environment is presented[2]. In another sense however, such events are just as 'real' as any to be found outside acousmatic music. The ability of listeners to identify a recording of an oboe, or for that matter a synthesised oboe, is not significantly different from their ability to identify a water sound, whether produced by granular synthesis techniques or through an actuality recording. The recorded and diffused acoustic structures may to a certain extent be impoverished, but this does not mean that listeners may not exploit their sensitivity to invariances in the perception of individual sounds or the structural relationships between them. The differences between listening to an acousmatic piece and listening to the environment are important and unavoidable. In sections 2.2 and 2.3 they will be discussed and shown to reveal important consequences for the perception of affordances, and for aesthetic interpretation. Here, such discussion will be deferred in order to address the role that event perception can play in providing a suitable level of description for acousmatic music.

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[2] Noble (1981, p. 68; also see Gibson, 1966, pp. 233-234) notes the same limitations for film projection. Here, since the visual image is, amongst other things, insufficiently wide to fill our visual field, it is this, not our head and eyes which constrain looking and hence perceiving. In fact there are much more pressing *contextual* and *social* perceptions which constrain the sense of realism in both cinematic and acousmatic presentations which will be discussed in section 2.3. Although, as Noble points out, visual displays that fill the field of view can produce physiological reactions that suggest greater 'realism', such reactions are not generally *interpreted* by the perceiver as being 'real.'

Given that the human organism's perceptual systems have evolved to pick up invariant acoustic structures that specify everyday events it is reasonable to suggest that where these invariant structures occur in acousmatic music a listener will be able to perceive the events and objects which would normally and lawfully give rise to such structures. It is sometimes all too easy to confuse the sounds of an acousmatic piece with the 'accidental' sounds that often intrude into listening environment. Given that most acousmatic pieces eschew more familiar 'musical' events such as discrete pitch structures, relatively hierarchical or periodic rhythmic structures and familiar instrumental sources, more often than not, the only familiar structures available to the listener are those that specify everyday events. Moreover, given that such familiar events may be directly specified, it follows that any longer term sequence of sounds is liable to be perceived in terms of these events. As Howard and Ballas have shown, the 'syntactic' structure of a sequence of sounds interacts with the 'semantic' structure formed through the events that they may specify (see Howard and Ballas, 1980; 1982; discussed above on pp. 72-73). Any structural description of acousmatic music *must* take into account the possibility that listeners are sensitive not only to temporal and frequency relationships as such, but as information for events. Moreover, it is suggested that event perception most often dominates more abstract structures. This argument is as important for synthesised sounds and heavily processed sounds as it is for samples or more extended actuality recordings. This can work both ways: certain synthesis techniques betray their real causation to those familiar with them, whilst those unfamiliar with the technical processes and resulting sounds of computer music hear one or more virtual event of more general specificity. Frequency modulation, additive and subtractive sound synthesis, the use of a phase vocoder are all quite easily, even unavoidably, heard by practitioners in the field and early electronic music is generally easily identifiable for this reason alone. For a naive listener,

however, many FM sounds tend to specify bells through their inharmonic frequency structure; the sounds of early electronic music might specify the sound track of an early science fiction movie[3] and its attendant 'futuristic' technology which makes bleeps and bloops, because of their steady state or artificially filtered spectra; and many other synthetic sounds are heard as having percussive, or vibrating sources. The two types of listener may describe what they hear in different ways, and may focus upon different aspects of the auditory structure, but the links between such structure and the source event are lawful and 'out there' waiting to be discovered.

It could be argued at this point that by prioritising the perceived events that give rise to sound, such a perspective denies the 'musicality' of acousmatic music, reducing listening to the identification of sound sources and events. On the contrary, it is proposed that by assuming that abstract structuring principles might be identified which are independent of event perception one runs the risk of missing the most important facet of acousmatic music. The undoubted ability of listeners to perceive sources, even where such perceptions are non-veridical, suggests that it is precisely the gap between 'everyday' listening and 'musical' listening which is of importance. One must not forget that most of our listening is intimately concerned with events and objects, not their aesthetic contemplation. This 'gap' will be returned to in detail in sections 2.2 and 2.3. Here it suffices to emphasise that however inappropriate this level of description may seem to be, it is nonetheless of fundamental importance. Acousmatic music is often criticised for its resemblance to everyday sounds, whether mechanical or natural. It is the intention here to show that such resemblance, however inevitable, does not run counter to this music's aesthetic status. Describing the events that

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[3] Louis and Bébé Barron's music for the film *Forbidden Planet* manages to blur the distinction between sound effects and music through the use of identifiably 'synthetic' sounds: here the synthetic nature of the sounds is dominant, and seems to occupy a strange position: the sounds are virtual in the sense that their sources are supposedly from the future, but quite real in the sense that they correspond to the operation of the machinery in the film *and* in that their real sources (oscillators and noise generators) are perceived.

acousmatic music specifies provides a level of description to which all listeners have access, regardless of their ability to mediate such perceptions through abstract terminology. Moreover, the perception of sound-producing events affords analysis that takes into account the longer term 'causal' connections between such events. Juxtaposing and merging sounds in an acousmatic piece cannot be viewed in purely abstract terms. If events are directly perceivable, then their temporal positions and transformations in a piece are subject to the lawfulness of perception: the connection between the sound of a door and its handle are not spectrally related but related through our familiarity with their sources' physical relationship and our perceptual relationship with these sources' affordance structures (as in Wishart's piece *Red Bird*). Similarly, the close temporal proximity and sequential order of a noise burst and a harmonic sound which gradually decays in intensity makes sense as an object being struck or plucked in a way which these sounds on their own or in reverse order do not (see e.g. Smalley, 1986). It is not suggested that this should be interpreted as *prescribing* any relationship between sounds. What is proposed, however, is that to ignore such relationships is to ignore the kinds of structure with which human listeners are most familiar. Moreover, it is not suggested that an ecologically 'illogical' sequence or combination of sounds is illogical *per se*. However, such a sequence or combination may be perceived within the context of the lawful nature of the everyday environment. By identifying ecologically lawful sequences of events it is possible to describe and analyse acousmatic music in a fashion that is grounded in the familiar perceptual context within which listening most often occurs, but which assumes nothing about the way in which acousmatic music *should* be heard. In the following section the limits of this approach will be tested, and it will be shown that event perception provides an essential, but preliminary, stage in forming descriptions and analyses of acousmatic music.

2.1.4 Event perception and analytical pertinence

In Chapter 1, attention was drawn to the problems of defining the "pertinent units" of acousmatic music. The appropriateness of deriving a definition of pertinence from research in timbral perception, Schaeffer's conception of the *objet sonore* and a number of documentary and notational sources was questioned. It was argued that perceptual descriptions might form the basis for defining pertinence, especially where such descriptions avoided the implicit and explicit assumptions made about music's self-referential structure. Indeed, the mimetic aspect of acousmatic music was seen to demand attention to the ways in which sounds relate not only to each other, or to a culturally convened musical system, but to the 'extra-musical' world. Event perception seems immediately to provide a theoretical framework for observing such 'extra-musical' concerns. In its insistence upon describing sounds as information for events, it explicitly points towards an analysis of acousmatic music which regards events, not sounds, as the primary units of auditory perception. Within such an analytical approach, pertinence might be defined according to the events that may be perceived through the acoustic structure of the music, rather than acoustic structure in itself or any higher level description of that acoustic structure such as rhythm, pitch or timbral structure. Hence, one might argue that segmenting acousmatic music according to the events perceived provides a valuable alternative to segmenting it according to specious acoustic or documentary evidence. Such segmentations could then be analysed according to the relationships between events that might be perceived by listeners. Pertinence in acousmatic music would therefore become defined according to the lawful nature of everyday listening, and one might argue that such a mode of listening represents some primitive or naive level of perception: sounds would be distinguished from one another and related to one another on the basis of distinctions and relationships between their

perceived environmental origins, however virtual these might be. Such a definition of pertinence would lead to analyses that explicitly prioritise the 'extra-musical' aspects of acousmatic music.

Although such a basis for defining pertinence might be preferable to Nattiez' unwarranted trust in the scores of acousmatic pieces (see Chapter 1, p. 33) as the evidence upon which a process of "discretization" might result, it would entail a considerable cost to the analyst. Just as one might criticise existing analytical approaches for their implicit or explicit immersion in the ideology of musical self-referentiality, such an event-based segmentation procedure would be guilty of ignoring the musical context within which listeners perceive acousmatic music. In order to illustrate the consequences of ignoring the distinction between 'everyday' and 'aesthetic' perception two analyses will be discussed below, one of which takes a radical view of the role of everyday perception, the other a more flexible view. Both analyses take as their starting point the everyday familiarity of the sounds in acousmatic music, and both assume that listeners exploit acoustic invariances in their interpretations of the music. However, the analyses differ in their interpretation of the ecological approach to psychology itself, and point towards the different ways in which such an approach might be used to discover 'meaning'. The two analyses will also reveal an important distinction between two conflicting approaches to 'structure'. Although the first analysis may seem the most radically 'ecological', it is the second that shows the way in which Gibson's approach to perception might provide a fruitful alternative to the view that musical artefacts can be analysed as closed and self-referential objects which refer only to themselves and a canonic musical tradition, and the first that implicitly maintains such a view.

The first approach (Windsor, 1994), considered the consequences of segmenting and analysing a fragment of Denis Smalley's *Wind Chimes*

(music example 2.1) according to a strict definition of pertinence derived from ecological acoustics:

> "...the acoustic surface of an electroacoustic piece may be segmented on the basis of ecological pertinence; whether a sound or sequence of sounds is perceived to be caused by a familiar everyday source. Just as linguistic pertinence may be derived from the relationship between acoustic changes and the discrete categories provided by a system of language..., electroacoustic pertinence is derived here from the relationship between acoustic changes and their specification of discrete environmental events."
>
> (Windsor, 1994, p. 305)

In a similar fashion to that of Gaver (1993) the sounds of the extract are classified according to the materials and interactions between materials that would cause these sounds in everyday situations. These classes of event are general enough to avoid any discussion of cultural specificity: describing a material as /solid/, and an interaction as an /impact/, it is argued, expresses cross-cultural information that listeners might use in the perception of events' affordances. These *paradigmatic* classifications allow a *syntagmatic* analysis which produces a linear, but parallel, segmentation of the extract, and more than this an analysis of the possible causal links between separate events. For example, a /solid impact/ followed by /vibrating solid/ would become syntagmatically linked as they could be interpreted as having a causal environmental relationship.

The question of 'interpretation' leads to the first problem of this approach. Despite the formal nature of the analysis, the decision to interpret a particular sound as corresponding to a particular event seems at once over-constrained and arbitrary: by appealing to some ideal 'naive' listener, or more precisely an individual's ability to masquerade as such, the analysis rests upon a definition of pertinence which is contrary to the whole spirit of the ecological approach. As noted in the previous section, sounds are not classified by our perception of their invariances, rather it is their *affordances* that are specified. Within this context the notion of interpretation seems oddly out of place: if the analyst has to interpret the sounds he or she hears in order

to arrive at the ecological units of the analysis, and then bases an analysis on the labels provided for these units, then clearly the analysis, however ecological in its motivation, has departed from ecological principles to some considerable degree. The resulting analysis replaces a "neutral level" based upon documentary evidence or acoustic analysis with an analysis that purports to be ecologically neutral. The whole notion of neutrality, however, is questionable: sounds may provide information for events, but the affordances of these events are not determined by these events alone, but our relationship to them. By proposing that an analysis based upon source events is neutral, the mutuality of perception so important to the ecological approach is denied. To argue that the sound of 'two solid objects' colliding specifies the same thing as hearing two *specific* objects colliding such as 'leather on willow' denies the difference between hearing leather on willow and any other two objects just as it denies the differences between hearing leather on willow for someone listening to an acousmatic work and someone listening to a radio broadcast of a cricket match . Interestingly, the affordance of hearing 'leather on willow' is as unclear as it is for any listening situation in which direct involvement seems inappropriate: it cannot contribute to an affordance of 'catching' in a radio broadcast, but nevertheless accurately specifies an event with clear meaning. The generality of this first analytical approach seems to obscure as much as it reveals through its appeal to everyday listening in an extremely un-everyday context.

The second problem with this first approach is that it makes an implicit assumption about the distinction between 'culture' and 'nature' in perception. Although Gibson makes a clear distinction between "direct" and "indirect" perception (Gibson, 1966; 1979; Reed, 1991) this distinction is not to be confused with a simple culture-nature divide. Direct perception refers to perception that operates by virtue of an organism's ability to pick up unmediated affordances; indirect perception refers to the perception of

anything mediated through the representation of perceptual information in another form, such as pictures, speech, writing and so on. Within this context a cultural artefact may be perceived directly and indirectly: a book may afford 'grasping' and 'opening' *directly*, just as its written contents might *indirectly* inform the perceiver. As both Costall and Still (1989) and Noble (1981) point out, the distinction between indirect and direct perception itself proves problematic. The human environment is largely made of human artefacts, making it difficult to distinguish between indirect and direct perception: the social and cultural constraints provided by the human environment have led such commentators to suggest that socially and culturally mediated information might not be perceived in a fundamentally different way to that provided by the unmediated environment. Just as a book affords 'reading', so also the acoustic information in an acousmatic piece might afford active involvement of a specific kind quite different from that afforded by the same acoustic information in an everyday context. The sounds of an acousmatic piece are mediated by both social and technological means, and if one is to talk of the affordances of the events they might specify, it becomes necessary to analyse more carefully the effects on perception of these factors. As Smoliar (1993) points out, both Gaver (e.g. 1993) *and* Schaeffer (1966) tend to disrupt the continuous and mutual relationship between an organism's perceptual systems and environment (Gibson, 1966) in their concentration upon sound as a discrete source of information. The exploration of the environment does not just result in changes in the auditory domain, but within the context of information provided across the senses of an organism. The perception of an acousmatic piece does not occur in a purely auditory domain, and the affordances of such a piece cannot be viewed without reference to corollary information picked up by the listener. It is intuitively clear that a listener at an acousmatic concert does not perceive the affordances of a lion's roar in the same way as a hunter on the plains of Africa, however

'realistically' recorded and diffused, despite that listener's pick up of the same acoustic invariances. The analysis discussed above builds its description and analysis of an acousmatic piece upon a closed system of relationships telling us little about the relationship between that piece and the perceiver. Although the relationships analysed are based upon everyday listening, they fail to do more than replace 'musical' relationships with 'everyday' relationships in such a way as to deny the cultural and social significance of sounds. Moreover, in the 'bracketing' of other sources of information such an analysis is as limited in scope as that of an analysis based upon Schaeffer's "objet sonore".

In order to show how event perception *does* provide the basis for a more revealing analysis a second approach will be advanced. During the course of Wishart's *Red Bird* the sound of a slamming book is transformed into the slamming of a door (**music example 2.2**). Wishart seems to intend this transformation as an expression of the imprisonment of freedom by rational, logocentric thought (see Wishart, 1978). Leaving to one side, for simplicity, contextual information, such as the threatening utterance "listen to reason" and the buzzing of the "fly" that accompanies the transformation, one can clearly see that the isomorphism between 'book' and 'door' requires the perception that some structural feature common to both sounds is held invariant, that of the auditory information that specifies 'slamming'. Moreover, it is necessary for some features to be transformed between the two events, those that specify the materials that are in collision: bound paper in the case of the book and the solid material of the door. Wishart exaggerates the differences between the materials by presenting the sounds of pages being turned in the case of the book, and a rattling handle in the case of the door. An *isomorphic* relationship is thus created between two distinct events by their common information for slamming, yet the two objects are distinguishable by virtue of information for the different materials that are slammed. This level of

perceptual similarity manages to link two very different objects allowing for the semiotic isomorphism that Wishart desires. The particular interpretation proposed by Wishart of <<imprisonment by reason>> might not be reached. Instead one might interpret the link between the two sounds as <<imprisonment *of* reason>>, for example. Although Wishart states that the book sound is that of a book being slammed on a table (Wishart, 1992), it is quite easy to perceive this sound as that of a book being slammed shut. The shutting of a book *hides* the text, and this could be equated with the shutting away of reason. Moreover, even if one perceives a book being slammed down on a table, one could interpret this as being a casting away of logos, and hence an isomorphism between such a rejection of reason and imprisonment. Table 2.1 illustrates some of the possible levels of isomorphism in operation in schematic form.

<table>
<tr><td>Semiotic isomorphism</td><td colspan="2">Imprisonment (of?/by?)reason</td></tr>
<tr><td>Interpretation</td><td>Reason</td><td>Imprisonment</td></tr>
<tr><td>Interaction specified (perceptual isomorphism)</td><td colspan="2">Slamming</td></tr>
<tr><td>Material specified</td><td>book</td><td>door</td></tr>
</table>

Table 2.1

The peculiar power of this transformation lies in its operation at the level of both event perception and signification, and it is noticeable that both allow for flexibility of interpretation. It has been noted that perceptual information may be insufficiently specific to distinguish between two similar events, leading to the possibility of two radically different cultural interpretations. Such flexibility could also be mediated by cultural context. One might be more likely to hear 'book on table' if one shared Wishart's anti-

logocentric perspective, or indeed if one had read Wishart's document (Wishart, 1978) or sleeve notes (Wishart, 1992).

This analysis shows the value of Gibson's ideas in providing the framework for discussing the 'structure' of an acousmatic piece and the relationship of this structure to direct and indirect perception. It distinguishes between two levels of structure: a level based upon direct perception, and a level based upon culturally agreed, or mediated perception, and attempts to show the way in which these two levels interact to form both a 'narrative' based upon the perception of sources and an 'abstract' structure which emerges in conjunction with such perceptions. Sounds are seen as acting as direct information for events, and as denotative and connotative *signs*, and a distinction is drawn between event perception and 'semiosis', the former being lawful and constrained by our perceptual coevolution with the environment, the latter by our familiarity with the culturally convened content of events that may be perceived directly. The example also suggests that although event perception may explain what we perceive, the interpretation of the structure of the piece relies upon a degree of isomorphism between events with ecologically similar origins. This isomorphism is difficult to explain in terms of shared affordances, but seems to originate in shared invariances. Indeed, the question of isomorphism recalls notions of abstract musical structure such as thematic or tonal recapitulation. Here, however, the isomorphism occurs not at the level of the sounds themselves, but at the level of the events that they specify, and the cultural significance of these events. In this way, the analysis reveals the way in which the specificity of event perception may lead to the possibility of structural coherence within an acousmatic piece. Whether or not any 'narrative' is explicitly perceived, the events perceived provide the basis for a remarkably 'musical' structure. Describing this extract in terms of acoustic transformations cannot explain why we hear book and door being slammed or closed, rather than any other

acoustically similar sounds, nor can it explain why this denotative labelling might lead one to interpret these specific events as having further connotations. Through retaining an awareness of sounds' *informative* nature, it becomes possible to pay attention not to the structural implications of sounds in themselves, but to the structural implications of the events that they specify.

However, the question of how one might interpret this extract has not been satisfactorily addressed. Event perception alone provides a description of acoustic structure that may be of pragmatic value in music analysis, but no progress has been made toward explaining the seeming gap between perceiving the affordance of an event, and interpreting it as an element in a musical structure. Clearly, in this example much of this interpretation rests upon our perceptual systems' tendency to pick up the real or virtual origins of sounds. However, this does nothing to explain the relationship between direct and indirect perception, between cultural conventions and affordances, nor does it explain how the directly informative nature of sounds becomes at once divorced from, yet constrained by the lawfulness of the everyday environment and our actions. To take a more global example from Wishart's music, the extract referred to at the end of Chapter 1, from the beginning of the same piece (**music example 2.3**), seems to illustrate just this tension between direct perception and indirect interpretation. The events themselves are recorded and presented in such a way as to retain some vestige of their everyday affordances, yet are juxtaposed and recontextualised in such a way as to override everyday behaviour. The events specified are dangerous and hence might afford 'flight', yet the listener does not run away. The listening context, and the recontextualisation and transformations between sounds (barking to machine-gun, human cries to seagull) militate against such everyday affordances. In order to clarify this as more than tension, the whole notion of affordances and interpretation must be readdressed. In section 2.2 the relationships between direct and indirect, 'natural' and cultural', perceptual

and interpretative, will be addressed in order to clarify the relationship between 'lawful' and culturally or socially convened perceptions. Following this, section 2.3 will attempt to reconcile the functional nature of affordances, the direct links between perception and action, with the supposedly 'aesthetic' nature of acousmatic music. Thus far, the pertinence of events as analytical units has been demonstrated, but the nature of the structures that may be perceived through the combination of such units within the context of an acousmatic piece has yet to be explored with sufficient theoretical clarity.

2.2 Ecological perception, society and culture

2.2.0 Direct perception and the problem of mediation

Gibson's concentration upon 'direct' perception, and his rejection of conventional views of perception as dependent upon cognitive processes and representations (Gibson, 1966; 1979), suggests a considerable resistance to the study of cultural and social issues in perception. If one wishes to describe and analyse acousmatic music in ecological terms, taking into account the mutual relationship between listeners, their environment and the structured information available from acousmatic music, then it is vital to clarify the way in which social and cultural information may be integrated within an ecological approach. Only through this will it become possible to form descriptions and analyses of acousmatic music that are internally consistent: a piece-meal approach that overlays a semiotic, or traditionally cognitive, interpretation of social and cultural significance upon event perception will tell us little about how cultural knowledge is related to 'direct' perception. Through adopting an ecological approach to social and cultural issues in perception it will prove possible to describe not just 'what' is heard by a listener, but how this relates to this listener's position within the *human*

environment. This approach can show the way in which the human environment provides constraints upon cultural and social behaviour, whereas a piece-meal approach simply accepts the divisions between perception and cognition, between nature and culture, between music and the everyday, without attempting to reconcile these dualities. Accepting that events are directly perceived, but their meaning is constructed, not only betrays the central issues of functional meaning raised by Gibson's assertion that it is *affordances* that are perceived, but also introduces an unnecessary division between the products of human behaviour and the 'natural' environment (Costall, 1989; Costall and Still, 1989) which precludes discussion of their relationships in a consistent fashion. It is clear that sounds may have social and cultural functions, play a role in communication, and take on aesthetic and commodity value (see e.g. Truax, 1984 for a discussion of acoustics in communicational terms): the challenge here is to show how such *mediate* functions may be described not as fundamentally special cases of perception, but as part of our mutual relationship with a social and cultural environment. This permits one to debate the way in which acousmatic music seems to mediate the perception of sounds through contextual and conventional means in terms of the information available to the listener, and hence allows one to describe how such mediation relies upon the listener's exploration of the structured environment, rather than his or her imposition of structure upon that environment.

The importance of studying acousmatic music from this perspective is driven by the problematic nature of standard approaches to the genre (see Chapter 1). An analyst must choose to interpret music according to some broader framework, however implicit. Here an attempt will be made to choose a framework that *explicitly* positions acousmatic music within the context of our everyday actions and perceptions. Within such a context the differences between musical and everyday sounds become contingent upon the

information available to the listener. This contingency can be observed immediately in the material of acousmatic music, and it is highly unsatisfactory to explain away such contingency through nominalist or essentialist arguments. It is not enough to say 'this is heard as music because it is labelled as such', 'this is music because I or others have decided it is music' or 'this is music because it has such and such features'. These statements may lead us to perceive a sound in a particular way, relative to a particular context, but they do not in themselves explain the basis upon which such statements might be offered or perceived. Similarly, perceiving that a bell sound signifies /fire/ cannot be explained by simply stating that this sound occupies a particular position within a culturally convened code. Why, and under what conditions, do bells also signify /prayer/, /a town meeting/ and so on? How do we tell which course of behaviour is appropriate to a sound? How do we choose which coded content to apply?

The intention here is not merely to describe the relationship of signs within a code, but to describe the relationship of the human organism to that code and its usage. The concept of an affordance seems to help here, by suggesting that a bell sound affords particular courses of action ('attention', 'looking', 'running', 'attendance'...) depending upon the listener's particular environmental context. In the following sections an attempt will be made to show how the human organism perceives such socially and culturally mediated affordances, and how this illuminates our view of listening as a contingent pursuit. Through this discussion it will become clear that describing an acousmatic piece in a perceptually motivated fashion must take into account the active relationship between listener and environment, and the various sources of stimulus information available to the listener which guide and constrain this relationship.

2.2.1 Ecological approaches to social and cultural perception

A number of approaches have been taken to the problem of reconciling Gibson's theory of direct perception with the supposedly 'indirect' sources of knowledge which exist in the human environment (e.g. Noble, 1981; Reed, 1991; Costall, 1989; Costall and Still, 1989; Kugler, Shaw, Vincente and Kinsella-Shaw, 1990). Language, pictures and symbols of all kinds; perceptions mediated through technology and social interaction; memory and imagination, all seem to fall into an area of 'indirect' perception within a Gibsonian approach. Indeed, as Costall notes, 'indirect' perception is so variously identified (Costall, 1989) that it is often unclear how any perception may be direct:

> "...I am not at all convinced by Gibson's recurrent image of culture as merely a kind of potentially distorting screen partly interposed between us and an independent, 'real' world, a 'wilderness', beyond. This is surely wrong. We are *in* culture; it *is* our world. Indeed, it is the only world we could ever directly perceive."
>
> (Costall, 1989, p. 19)

Due to the all-pervasively cultural and social environment in which we perceive and act, it seems extremely problematic to insist upon a dualism between direct and indirect perception, especially since Gibson himself defines this boundary in a number of distinct ways: is indirect perception the kind of perception that occurs where incomplete or ambiguous stimulus information requires "guessing" in addition to an extended search for collateral information (Gibson, 1966, p. 303-304), or the kind of "mediate" perception that occurs in relation to coded, socially mediate communications that predicate or represent the direct perceptions of others (Gibson, 1966, e.g. p. 91)? As Costall (1989) points out, the dualism inherent in making distinctions between direct and indirect perception creates a muddle which was never untangled by Gibson.

This potential for confusion and the way in which dualism is reinserted into what seems a fundamentally non-dualist or *mutualist* approach to the

perception of meaning suggests two possible approaches to bringing ecological perception into contact with cultural and social issues to Costall and Still (1989). Either one accepts that there is a primitive and culturally independent form of knowledge which may be directly perceived through "the simplest and best kind of knowing" (Gibson, 1979, p. 263) and that knowing mediated by "instruments", "language" and "pictures" or through imagination or memory is of a quite different kind, or one attempts to show that one might deal with questions of cultural relativism and convention without implying any distinction between events, surfaces, objects and their *multiple* and socially contingent affordances, rejecting this dualism and embracing mutualism. The benefit of the second course to this project is that it allows one to observe the way in which stimulus information may provide affordances of different kinds within different contexts without losing sight of the way in which acoustic structures may themselves specify particular events. The question of why a listener interprets particular sounds in different ways depending upon their context becomes a question of what kinds of available information provide the grounds for perceiving and acting upon such differences. Hence, rather than develop Reed's implicitly dualist version of ecological perception (Reed, 1991), where the *mediation* of direct perceptions provides the key to an ecological approach to cognition and cultural significance, the following argument will focus upon the argument that affordances themselves are culturally relative, and open to social mediation (Noble, 1981; Costall and Still, 1989). It will become clear that the perception of acousmatic music is constrained both by the structure and order of our relationship to the 'natural' environment, *and* by the structure provided by social interaction and cultural convention, and that our active exploration and modification of these structures gives rise to a wide variety of affordances, not just those implied by a narrow view of the environment as pre-cultural and a-social, but not excluding those which could be considered 'everyday'.

2.2.2 Perception in a cultural and social environment

In what ways, then, can one reinterpret the social and cultural realms in terms of affordances? It is traditional in semiotics to distinguish between 'expression units' and 'signifiers' which have physical reality and the 'content units' or 'signifieds' which exist as a system of cultural conventions (see e.g. Saussure, 1983; Eco, 1979). Within such a perspective the relationship between an expression and its meaning or content is not governed by any *direct* connection between, for example, an acoustic signal and its interpretation: such links are regarded as arbitrary, as they differ between languages and cultures, or at most "motivated" by some form of similarity or isomorphism between signifier and signified. Indeed, Eco (1979) has claimed that it is unnecessary to relate meaning to any physical referent. 'Meaning', within this view, is determined by a system of oppositional relationships between signifiers, and between signifieds, not by the recovery of an intended message, or by reference to the world. However, it is intended here to show that despite semiotics' proposal that social convention is central to the interpretation of signs, such coded relationships should not be regarded as foreign to an ecological approach to perception.

The main reason that semiotics seems so incompatible with ecological perception lies in its insistence upon a duality between expression and content. One is physical, the other cultural or social, recalling the distinction between sensation and representation in cognitive science. Eco distinguishes between "signals" and "stimuli" in themselves and their interpretation as signs (Eco, 1979) despite extending semiotics to all but the most automated or biological processes. Indeed he sees semiotics as playing a role in identifying the "missing link" between signals and signs (Eco, 1979, p. 21). Within an ecological approach such distinctions are meaningless: the organism neither reacts to stimuli, nor does it interpret them; rather, the organism discovers the affordances of events and objects through stimulus information which neither

determines meaning nor allows for completely arbitrary relationships between organism and environment. Within this context there is no gap between 'signifier' and 'signified' that is not the result of applying an inappropriate level of description to one or both of these abstractions. Interpreting a sign becomes not a matter of decoding, but a matter of perceiving an affordance. The 'knowledge' which makes this possible is not physical or mental, but the result of attending to structured stimulus information. A system of cultural agreements is not internal or external but the result of acting and perceiving within a social environment within which other organisms produce structured information in the form of utterances, books, films, music, tools, facial expressions, gestures and so on. These forms of information are not communicated from one individual to another, but discovered through perception and action. The exploration of the human environment makes such information available, and such information provides affordances which constrain the actions of individuals, but do not determine them: just as a rock affords many possible actions, so a sentence may afford multiply. In an ecological approach, language must be approached functionally, and signs described in terms of the information they offer to a human organism. Rather than ask what the word 'freedom' means one should ask what it affords to a particular individual. Asking what a word means leads one to *produce* a definition, to *make* a gesture, to point to the American flag (or burn it): within semiotics such an approach clarifies the flexibility and self-referentiality of codes and their interpretation, the way in which systems of signs rely upon what has been termed "infinite semiosis" (Eco, 1979), but such an approach cannot explain *why* a sign results in particular courses of action.

Within an ecological approach a sign has multiple affordances, and the task is to correctly describe the stimulus information that provides the basis for these affordances in such a way as to explain the transaction between human and environment. Rather than asking why 'freedom' is used and

interpreted so multiply, one should ask what stimulus information is available to a particular individual and how this affords behaviour. This entails not only analysing the acoustic or visual structure of a sign, but also the structured information available to the organism which complements such information, whether from a book or from the gesture which accompanies a word, or from a blow from a policeman's baton. This thesis cannot hope to explore the perception of the cultural environment in detail, but will attempt to provide the basis for descriptions of cultural and social information of the same order as those of 'natural' information.

First, then, it is necessary to explore some of the structured information which provides the grounds for socio-cultural perception. Other human organisms are rich sources of information in a very immediate sense: the human body is open to exploration of a very 'direct' kind. One may perceive the movements of another human through looking, listening or touching. Such information specifies not only aspects of the activity of that human, but also detailed information regarding gender and even intentions (Runeson and Frykholm, 1983; Davidson, 1993). Although such research has concentrated upon visual perception, a degree of intermodality has been demonstrated for visual and acoustic information in musical performance (Davidson, 1993) and it can be assumed that such information may be picked up regardless of the particular perceptual system involved. Such pick up of structured information can be interpreted in terms of the perception of affordances: the perception of gender, for example affords many constraints upon behaviour dependant upon the gender of the perceiver, just as the perception of intentions may constrain and offer certain courses of action. However, such affordances are often culturally relative. Movements may specify what kind of human performs those movements, and what the intended result of those movements might be, hence providing *social* affordances, constraining the way in which the perceiver might interact with

the individual involved. However, these affordances look rather more complex when one considers the cultural relativity of gesture and movement or the kinds of *aesthetic* intentions which might be picked up. Perceiving that another human is of a different gender in itself does not necessarily explain the way in which human beings' courting and mating behaviour is constrained by 'moral codes' which seem to differ between different social and cultural groups. Similarly, perceiving the different 'expressive' intentions of a musical performer (Davidson, 1993) cannot be easily explained without such cultural context. Understanding whether a performance specifies an under-expressive or over-expressive intention is not just relative to the visual and acoustic information available at the time: familiarity with culturally specific information must be assumed. Moreover, 'interpreting' such information can only occur within a particular culture. In western 'serious' music culture, that in which a performer does not compose the music that is performed, it becomes possible to distinguish between a satisfactory and unsatisfactory performance of a canonic composition. Such a distinction can only be made relative to other performances of this piece, or contact with similar pieces, or, in the case of the musically literate, some coded representation of the score upon which the performer draws, or upon explicit information regarding performance practice and music theoretical conventions. This is quite different from the kinds of value judgement made regarding music which is only played by its composer: it becomes much more difficult here to differentiate between the canonic aspects of a performance and the 'piece' itself. Although collateral information may be used in forming an aesthetic evaluation, one cannot refer to another performer's version for comparison, or to the score.

As well as information that informs the perceiver about their intentions and activity, *per se*, humans produce structured information that informs the perceiver about events and objects that exist in a shared environment. The weight of an object may be specified by the movements of someone lifting it

(Runeson and Frykholm, 1983), just as we may be informed of the presence of an event by observing the actions of another. A look of surprise, pointing toward an object, an ostensive linguistic construction, may afford attention to an event which lies outside our visual field, for example. Just as social information provided by another through ostension may direct attention to an event which is behind us, so coded 'signs' produced by another human provide information about events and objects which are not immediately perceptible. Within this perspective a road sign, a book, and a facial expression are more similar than they might at first appear. The road sign, book and look of surprise inform us about events we have yet to perceive. Just as a facial expression provided by an onlooker may afford 'ducking' to avoid a missile approaching from the rear, a road sign may afford the necessary adjustments to driving necessary to avoid crashing on a sharp bend, and a book might afford one to avoid being duped by a totalitarian regime. Within Peirce's trichotomy of signs (Peirce, 1991, e.g. pp. 239-240) the 'facial expression' seems closest to an index, in that there is a causal connection between 'sign' and event (despite its possible social mediation), the road sign an icon, having a resemblance to an event (despite the coded conventions which may govern the precise way in which this icon is formed), and the book a collection of symbols, having only a conventional relationship between sign and event. However, all three of these 'signs' are social, in that they are made available by other human beings. Moreover, they can all be considered in terms of their affordance of avoidance.

The key here is to recognise that the human environment is not only social in that we perceive other human beings, but also in that we perceive the artefacts and expressions which are produced by their activities (Mead, 1934; Noble, 1981). Just because some of these artefacts inform us about unforeseen situations and may be perceived relative to cultural agreements does not make them any less 'direct' in a truly Gibsonian sense: to argue that the cultural

agreements which structure language or other symbolic codes are of a different order from the structures provided by inanimate or animal sources of stimulus information leads one to suggest that there is a definite dividing line between becoming sensitive to the natural and cultural environments. Just as learning a 'complex' sporting skill requires specialised exploration of the environment, so does the 'learning' of a code. Both may involve 'coded' or immediate social transactions and undirected or 'taught' exploration of the relevant 'environment'.

At this point a cognitivist counter-argument should be addressed. Surely, learning involves the 'internalisation' of structure: surely the environment of a skilled sports person is different from a novice in that these internalised structures literally create a 'different' and more structured world. Although Gibson's radical reversal of this philosophy may be demonstrated in that invariances may be experimentally manipulated and shown to portray a rather more structured version of the world than that normally assumed, it is also necessary to show that more complex patterns of action and perception can be described without the intervention of a 'mentalist' view. Although the example described below deals with insect organisation, it helps to show the danger of assuming that social 'knowledge' and complex inter-organism interaction and cooperation requires cognitive representation of the external world. The intention here is not to deny the role of memory, imagination, planning or symbol manipulation, but to raise the question of whether such processes illuminate *perception*. As this thesis will go on to argue, what is normally regarded as 'cognitive' has an important role in constraining behaviour, but not in the accepted sense of *determining* what we perceive and how we act.

Kugler, Shaw, Vincente and Kinsella-Shaw (1990) attempt to describe the extraordinary architectural prowess of termites in terms not of explicit knowledge but in terms of the informational and physical constraints that

these insects are sensitive to. The precise and complex structures that termites build through their collective actions seem at first to demand some form of program, map or template which informs their building: one might easily assume that like a group of construction workers, the termites are following a blueprint, albeit internal, rather than external. However, if one describes the relationship between the insects actions (movement, deposit of waste) and perceptions (pick up of attractive pheromones from deposited waste) it becomes clear that no such blueprint exists: the insects' 'cooperation', 'creativity' and 'skill' emerge from the dynamic and continuous cycle of depositing waste at sites at which pheromones may be perceived, the limits of diffusion of these pheromones and so on. The 'arches' and 'pillars' of a termite nest result from the way in which individual termites are coupled not only to the constraints of the environment and their effectivities but also to those provided by their fellows' actions. Interestingly, the comparison with construction workers reveals the continuity between this 'un-coded' behaviour and the interpretation of codes. Construction workers do not perceive the actions of their fellows through the pick up of pheromones, but through the exchange of language and gesture. Moreover, they *are* in a sense constrained by an explicit blueprint: but this blueprint is external, it is perceived, and adjusted according to the day-to-day problems which are encountered in construction. Although the situation is arguably more complex, the social exchange afforded by linguistic and diagrammatic codes still operates within the broader context provided by the connections between individuals and between these individuals and their environment. Each construction worker perceives and acts within a constraining context, yet with considerable flexibility. At the simplest level of description the survival of individual workers is at issue not only through the immediate dangers of working on a construction site, but in that failure to complete the work satisfactorily may

result in financial, and hence survival consequences for members of the social group involved.

In summary, then, it has been proposed that the perception of other human beings, and their immediate and more permanent artefactual products can be explained within the context provided by an ecological account of perception. Codes are to be seen in terms of what they afford and how they are made and used by individuals within a social and cultural environment. Rather than using Gibson's assertion that "knowledge *about* the world rests on acquaintance with the world" (Gibson, 1966, p. 28) to support a dualism between direct and indirect perception, an approach has been taken which subsumes cultural and social knowledge within a wholly ecological description, based upon the concept of affordances, as suggested by Costall and Still (1989). Society and culture emerge from the social and cultural transactions between individuals, however mediate they seem.

Indeed, some of these transactions occur through the production of artefacts that are discovered and manipulated by individuals, through the perception of tools. Tools make stimulus information and affordances, otherwise unavailable, directly perceptible, and often serve a similar function to more explicit 'signs':

> "most of these (the affordances of objects in our surroundings) are actually designed and constructed in order not only to function appropriately but also to be conspicuously meaningful to a potential user."
>
> (Costall, 1989, p. 19)

Tools not only afford things which exceed the limitations of the human body and perceptual systems through making available stimulus information and effectivities, but also afford social and cultural transactions. A tool's affordances are manufactured by others, and they are in a sense, whether 'coded' or not, a transmission of information. This transmission is not meant in any naive communicational sense: certain tools may be used in ways unforeseen by their originator, but the use of a tool made by another both

relies upon social interaction and may afford perception of the social and cultural information relevant to a particular environment. Using a screwdriver embeds an individual within a cultural context suffused with implications about that culture's character: through examining its highly immediate affordances, in relation to screws, various materials and so on, the individual is already embedded within a culture in which such technology is shared. Similarly, through extended familiarity with written and spoken language, and the environmental contexts within which certain stimulus information becomes available, the affordances of these 'codes' may be explored and developed. Each user of a tool may discover novel affordances just as each user of language may do so: but such novelty is constrained by the social connections between individuals as much as by the structure of an individual artefact or utterance.

In a similar sense, just as artefacts may inform us about the environment's socio-cultural aspects, so may 'natural' events and objects be manipulated by human agency in such a way as to afford 'coded' meanings. Just as a screwdriver might be used metonymically to refer to the technological or craftsmanlike, as a sign with very different affordances from that provided by its affordance of 'screwing', so might the sound of a bell be used in a context affording 'worship', 'community'; or a piece of rock from the moon come to stand for the boundaries of human exploration. Such use of natural events and objects does not entail a change in their 'physical' structure, but an exploration of that structure within a social and cultural environment. The bell itself is specified by its acoustic (or visual) structure: in one case it might afford simply 'attending' or 'ringing', in another it is perceived to be quite lawfully coincident with a town meeting or church service. The association of an event with another event is not just 'imposed' by the perceiver or by someone wishing to communicate, but is to be found in the mutual relationship between perception or action and the cultural

environment which is perceived or acted upon. The observation that "associations" are not made in the head, but due to our relationship to an environment in which events are lawfully related, and hence predictable (Gibson, 1966, pp. 271-273), is just as pertinent for cultural agreements as it is for natural ones. Associations between natural events and 'cultural' or 'social' affordances may be *made*, but they are also, once prevalent, open to *discovery* by the perceiver in the course of exploration and perceptual development.

Hence, there is no difference between 'cultural' and 'natural' environments. Rather, the environment within which the human organism exists *includes* symbolic, coded systems. Contrary to Reed (1991), I would contend that an event can 'stand for' another event due to our direct perception of the cultural portions of the environment. Signification is possible because the human organism learns to perceive the cultural affordances of events, relative to the social agreements of a group of individuals. These social agreements exist and are available to a group directly through their perception within a broad context of usage in relation to the environment. Just as 'natural' affordances vary according to the context provided by the particular needs of an organism and the particular state of an environment, so the affordances of signs are rich and flexible. The sound of a lion would not afford danger to a hunter equipped with a high-powered rifle, just as the word /danger/ could afford many different interpretations depending upon the particular context it is placed within. This context could be provided by a paralinguistic inflection or its position within an extended text. <<Political danger>>, <<danger of death>>, <<danger of embarrassment>> can all be afforded by this speech event, when embedded within a particular environment.

Although it is at first unclear how a speech or music event may *lawfully* specify an affordance, one must remember that cultural environments are relatively stable. Diachronic change in the relationships between

expressive acts and their content are limited by the social necessity for communicational clarity. This diachronic stability is survival driven. The faster a language changes the more likely it is that geographically distant groups of native speakers would develop idiolects with little in common. Imagine trying to learn a foreign language that changed the expression units corresponding to commonly used concepts every week, or a culture where a book written six weeks ago was already in a 'foreign' language. Cultural transactions require a certain degree of permanence if they are to serve as means for communicating bodies of knowledge over long periods of time. Obviously, the cultural environment changes. Languages, for example, change to provide the expressions demanded by changes in the natural or social environment, which are in turn produced by the actions and perceptions of individuals and groups of individuals.

Given that the cultural environment is a dynamic system of agreed relationships between expressive acts, or signs, one can see that the 'direct' perception of events is not so different from the perception of coded meaning, in the sense implied by Gibson's use of the term "affordance". Both our natural and cultural environments change over time, but these changes are bounded by certain ecological limitations. On the one hand, nature seems, at the level of human perception, to obey certain physical laws. On the other, culture remains to a certain degree bounded by the limitations of communicability. Certain changes in cultural or natural environments may demand adjustive behaviour for a group of organisms. This requires dynamic adaptation, or learning. As Gibson himself states (1968, p. 285), learning is vital to the perception of affordances. One must regard cultural agreement in semiosis as a cultural environment, with as much external reality as the 'natural' environment.

Hence, signs are regarded as no less lawful than other events: the sound of a breaking bottle is lawfully related to its cause by our coevolution

with the environment of everyday events just as the speech act 'broken bottle' is lawfully related by our coevolution with a particular cultural code. It matters not that the 'real' breaking bottle event may not exist (cf. Warren and Verbrugge, 1984). The invariances that specify it may be synthesised (a virtual event) just as a human may utter a speech act in the absence of any immediately observable referent. Both circumstances rely upon the creation of an artefact: one provides acoustic structures which specify a breaking bottle by virtue of physical lawfulness, the other by the lawfulness of the code. A cultural code is not an abstract entity, but something that is perceived and made by social individuals. It is structured and predictable, yet open to modification, just as is the natural environment. Just as making a fire affords protection from the cold for a group of individuals, so making the utterance 'we should make a fire' might afford the movements which lead that group to make a fire, rather than any other form of protection against the weather such as a shelter.

In more extended terms, just as a weapon might afford defence against an intruder, making the utterance 'freedom is an inalienable right' may afford the actions that make us pick up the weapon and use it. Although the utterance 'freedom' may not seem as connected to the environment as the presence of an intruder, its affordance structure is most clearly specified by a particular cultural code, specific to English speakers, specific to a sub-culture that protects its territory with the use of force, specific to a culture in which, perhaps, artefacts are acted upon differentially depending upon ownership. Even ownership here is not an abstract concept. It may again be defined in functional terms: in a particular culture the exchange of certain tokens for an artefact entails certain patterns of action and not others. These patterns of action are explored, challenged and tested by individuals, but are there to be perceived just as much as the prevalence of gravity. A speech act which labels

such social information relies upon the perceptual availability of these structures.

However, the availability of these structures *does not determine action*. Just as the sound of a breaking bottle affords different things for a bare-footed person and someone wearing stout boots, the utterance 'this is mine' may afford different courses of action depending upon the social context: to a burglar possession is nine tenths of the law, whereas for the gun-toting house-dweller the exchange of money for an artefact provides a less immediate, but no less 'real' affordance. Language, or any other coded source of information, is mutually perceived and produced, in relation to the particular circumstances of an individual. Through that individual's perceptions and actions within a society that uses language, perception and action are constrained but not determined. We discover what an expression affords through our familiarity with the structure of the environment, an environment which is not only predictable on the basis of ecological physics, but also on the basis of the social and cultural relationships which we both perceive and create through our individual actions. If this were not the case, the social cooperation (and conflict) which characterises human behaviour would rely merely upon our direct contact with other human beings.

Language and other symbolic systems rely upon our perception of the structured information that is produced by other human beings, and which may be stored and transmitted between individuals who need not meet. Such information specifies affordances that otherwise would have to be individually discovered (see e.g. Reed, 1991). To say that a human's facial expression affords 'amiability' (Gibson, 1979, p. 233), and to deny that the expression 'I like you', does the same is to impose an absurd dualism upon perception. Although one source of information is visual, and the other acoustic, both are perceived in relation to the social and cultural context available, both can be perceived as affording 'kissing', and both might result in a slap in the face.

The fact that the acoustic information is coded in an 'arbitrary' form, may be a lie, and seems to rely upon cultural perceptions, cannot be used to portray the visual information as somehow better or more direct. A facial expression may be misleading, and may be 'coded' through reference to others' use of such expressions.

To extend this example, note that just as 'I like you' could be used by a character in a film or a book, so could a description or film of a facial expression. This storage and translation of 'real' information in a different form does not prevent the perception of an affordance. 'Kissing' may not be afforded by the facial and linguistic information for the characters, but how is this different from observing a couple in a real exchange? What is afforded for the observer? In one case the reader or film-goer cannot directly act upon the 'characters', but otherwise there are similar affordances available. The line "I like you" (or more strongly "I love you") in combination with a particular facial expression affords continued looking or reading, averting one's gaze, stopping reading, discussion of what has been seen or read, arousal, disgust: these are all made possible by our familiarity with the information provided, our own context, and most of all by our perception of structured invariants that strongly specify the subsequent kiss (and possible slap). The coded information available from language and facial expressions specifies affordances that are multiple and socially constrained.

The 'depiction' of a scene may alter the affordance structure, as in a case where we cannot intervene, but this does not mean that affordances are not perceived. A broken bottle may afford fighting, but so may a word, a sentence, a philosophy. Similarly, the sound of a broken bottle may be used in an attempt to convey 'fighting' or be perceived in these terms. In the second case the sound is used or perceived relative to a set of cultural agreements, which may or may not be shared or applied by one or both parties. In differing contexts the affordances of this sound will differ: in a crowded bar the event

might afford 'evasive action'; in a radio play the 'sound effect' specifies a change in the portrayed environment which would not afford any such direct action. However, this change in the virtual environment *would* afford a description of the scene as a fight in a bar, rather than anywhere else. Just as an event may orient us within a real environment, it may do so relative to a virtual environment. Rather than saying that an event in a radio play does not afford any bodily course of action, one might say that the context of a radio play affords 'safety', 'sitting still' and 'the production of a critical linguistic response' to the sound, as opposed to taking evasive action. The events themselves afford little unless related to the context provided by listener and environment, whether heard on the radio or in a real bar. Similarly, the sound of a linguistic utterance may or may not provide an affordance in itself, but only in combination with the diverse sources of information that accompany it, whether linguistic or not.

It is no different learning to discriminate the multiple affordances that are provided by a cultural artefact than it is to discriminate between the affordances provided by a natural event: both kinds of discrimination are made relative to the perceptual development of an organism, surrounded by 'cultural', 'social' or 'natural' occurrences which are structured and informative, and to the immediate context of that organism. Just as for a water-bug a fluid of particular density affords support, yet for a human immersion or swimming (Gibson, 1979, p. 127), human utterances, books, instruments and actions afford things for humans that they do not for other organisms. Within this approach one should not ask what a cultural or social affordance might be, but what cultural and social information affords. After all, what is culture? It is the products of a particular set of social individuals who share a particular environment. It is perceived just as anything else is perceived, through the continuous exploration of our surroundings, and constrains and facilitates human action through providing affordances specific

to that environment. Human actions, and the changes in the environment wrought by them, are meaningful because they are embedded within an environment that is social. This does not mean that meaning is fixed, any more than the affordance of any event is fixed. Culture is acted upon as well as perceived, just as are our inanimate, vegetal, animal and human surroundings.

2.2.3 Perception and interpretation

Within the perspective on society and culture presented above it becomes possible to reassess the notion of 'interpretation' in a fundamental sense. Gibson suggests that socially mediate knowledge, and knowledge mediated by memory, imagination and other 'cognitive' processes are not to be seen as having a direct role in perception (Gibson, 1966). The previous section challenges Gibson's assertion that the kind of knowing available from language is radically different from that available from the environment. Rather than accepting the traditional view of coded information accepted by Gibson and contrasting it with direct perception (1966, p. 244) an attempt has been made to relocate social and cultural perception within the notion of the affordance. This has serious consequences for how one might describe interpretation. In figure 2.2 Gibson's original comparison between linguistic and direct perception is reproduced.

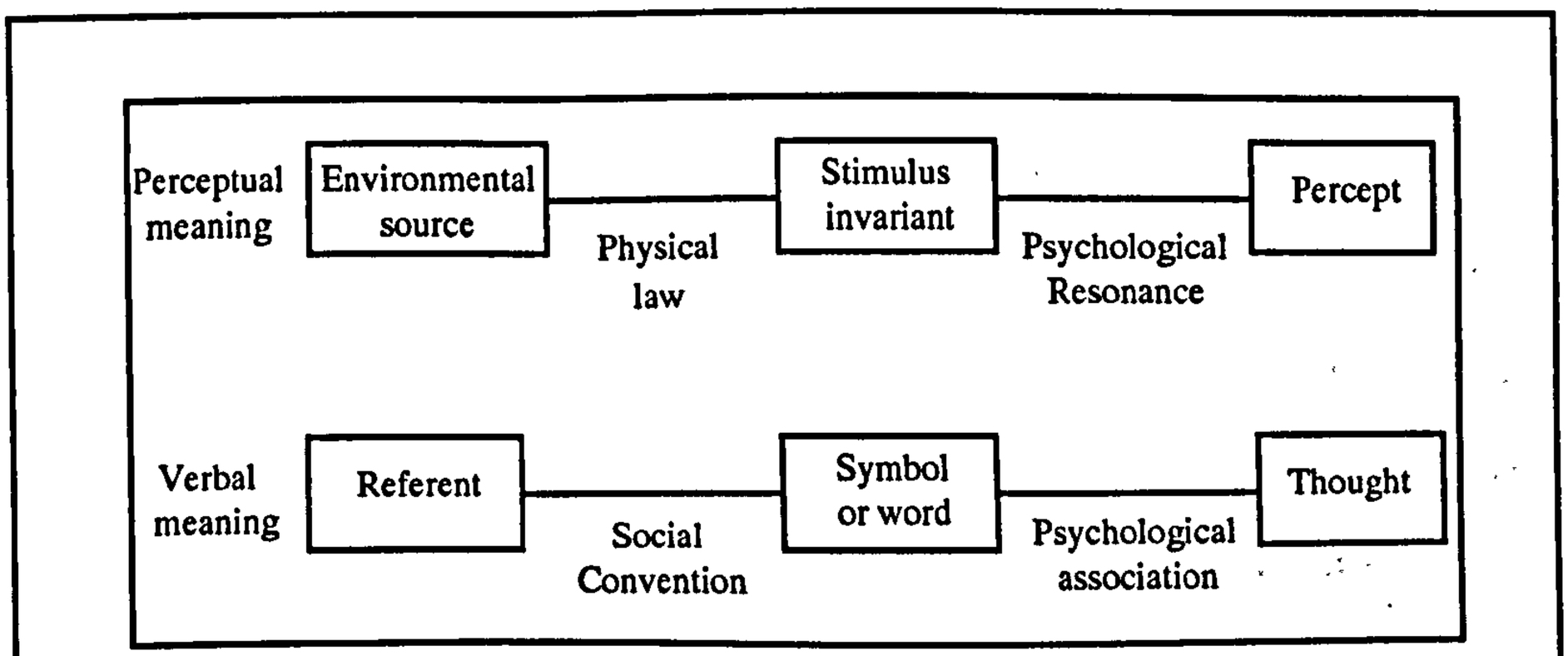

Figure 2.2 Gibson's comparison between the three-way relationships in language and direct perception. Adapted from Gibson (1966, p. 244)

Note that the mutual relationship between the organism and environment is not to be found here as an explicit feature. It is however, implicit in the terms used by Gibson to identify the 'boxes' and connections between boxes used in the upper diagram, representing direct perception, but not in the lower, which is intended to represent linguistic, mediated perception. The distinction Gibson makes relies upon his inconsistent description of the two types of knowledge, and representation of perception as a *chain* of transformations. Gibson notes that the relationship between "environmental source", "stimulus invariant" and "percept" is "three-way", but represents it in such a way as to conceal the mutual relationship between these. Nor does Gibson introduce the notion of affordances to clarify this mutuality (Gibson, 1966, p. 244). Indeed as we will see below, by reorganising Gibson's diagrams, and naming them consistently, the differences between linguistic knowledge and direct awareness seem to disappear.

The key here is to be found through providing a consistent level of description for the two types of knowledge. It is helpful to this end to replace the chain of transformations implied by Gibson's diagram with a triangular relationship. Peirce (1991, pp. 239-240, 180-187) notes that signs are not to be understood in terms of mere cause and effect. Through his concepts of "firstness", "secondness" and "thirdness" it become clear how 'meaning' or signification can be distinguished from mere causation. Two firsts, for example a footprint and a foot, may be causally related through a relationship of secondness: one directly leads to another. However, for us to interpret the footprint as a sign of the foot it is necessary to introduce a third term. In order for the footprint to be regarded as 'standing for' the foot, an interpretant must be added. The nature of this interpretant need not be a mental image (Eco, 1979, p. 68-71): it could be another 'sign' (a word, a gesture, an action). In the case of the present example one might represent the relationship between "sign", "object" and "interpretant" as in figure 2.3. If we take the "sign" to be

the footprint, the "object" the foot and the "interpretant" to be the word /foot/ it becomes clear that without "thirdness" nothing could be regarded as having been signified. The foot and footprint would retain a physical relationship, but no act of interpretation would have been made. Of course, this tells us nothing about the grounds upon which an interpretant may be chosen. However, it does point toward a more consistent conception of perception, as noted by Shaw and Turvey (1981).

In a naively behaviourist interpretation perception is a relationship of secondness: a stimulus conditions a response. In an ecological approach, however, stimulus information is perceived relative to both the structure of the environment and the organism.

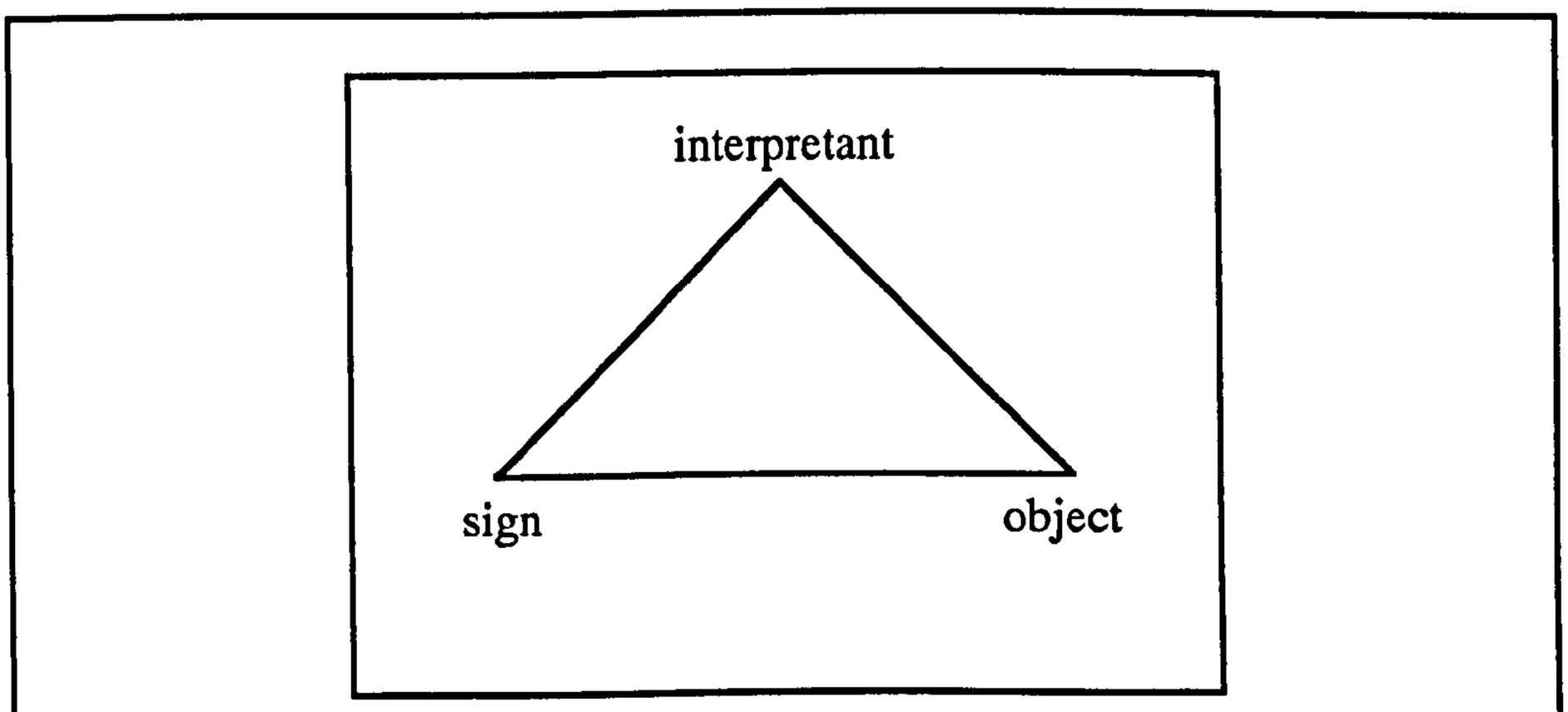

Figure 2.3 Peirce's triadic sign function between two firsts, forming a second, by virtue of a third.

Hence, our first relationship of "thirdness" might look like figure 2.4. Here, the relationship between information, organism and environment is clearly shown to be triadic. However, this does not quite capture the subtlety of the ecological approach: it is not the stimulus information itself that is perceived, but an affordance structure. The organism and environment are brought into a meaningful relationship by perceiving and acting upon affordances. However, affordances are a description of the relationship between organism and

environment, not the means by which organism and environment become coupled.

Hence, it would be incorrect, for example, to replace "stimulus information" with "affordance" in figure 2.4. Rather one should describe this triadic relationship itself as representing an affordance. A similar triadic relationship neatly captures the relationship between action, perception and structure: structured information is perceived according to the effectivities of the organism, and similarly the actions of the organism are constrained by the information that is picked up. Consider the relationship between a sound and the actions of an organism: we hear, for example the sound of a breaking bottle and go to collect a broom. It is easy to mistake this for a causal relationship between two "firsts": a "second". The nature of this relationship is concealed, however, in this version of the situation. Only by relating both the sound and the action through the structure of the event, a "third", does the affordance become clear. The sound itself does not cause the action, it is 'interpreted' by virtue of the structure of the event: without this "third" the collection of the broom is entirely mysterious, as it has no meaningful relationship with the sound *itself* but to the event specified. Similarly, one might consider the lawful relationship between sound and event as a "second", and hence suggest that this accounts for the affordance perceived. This too, however, collapses the true nature of the affordance: the action of the organism 'interprets' this causal relationship to create the possibility of meaning through a "third". Stimulus information, events and actions are the necessary components for describing affordances, and no pair of these terms provides a sufficient explanation of perception.

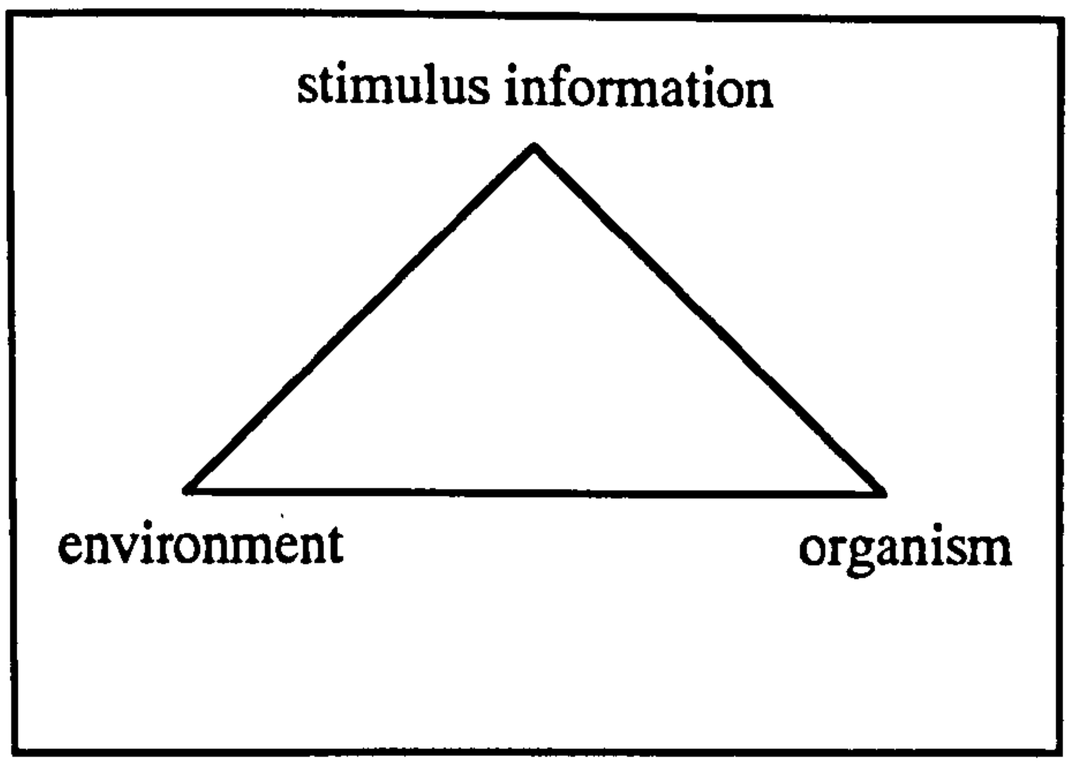

Figure 2.4 Gibson's ecological version of perception represented in triadic terms. Note that any of the three terms can take on the status of an interpretant relating the other two terms: organism and environment are related through stimulus information, just as organism and stimulus information are related through the environment. The 'meaning' is captured through the relationship of a third.

Comparing the lower panel of figure 2.2 and figure 2.4 seems impossible. But the comparison between figures 2.3 and 2.4 suggests a strong isomorphism. It is clear that just as a sign requires an "interpretant", so does an affordance: the action of an organism is not in reaction to stimulation, but in the triadic relationship between organism, environment and stimulus information. Collapsing this "third" leaves one with a deterministic relationship between stimulus and response. The affordance that is perceived is the result of the permanence or change in stimulus information relative to both organism and environment. In the same sense, if one regards the structure of a code as part of the environment, then a similar triad emerges: there is no need to suggest that the associations between invariants and events are any more "psychological" for language than for natural events: just as Gibson proposed that in an ecological approach "learning *by* association becomes the learning *of* associations" (Gibson, 1966, p. 273) through acknowledging the lawfulness of the natural environment, one should extend this suggestion to cultural and social knowledge. We become sensitive to the associations

between symbols and their directly perceivable consequence, we do not impose them upon culture.

Returning to the notion of interpretation, Peirce's trichotomy helps untangle a relationship between action, perception and stimulus information which reveals an ecological description of what it is to 'interpret' a sign, and through this the relationship between culture, society and perception. The interpretant of a sign function is an active, not a passive phenomenon. The social and cultural nature of the human environment affords the production of interpretative actions: interpretations are *made* by human beings in order to supplement the information available from the environment. In a certain sense Gibson's view of the function of socially mediated knowledge is correct:

> "The human learner, from childhood on, often needs to be given an acquaintance with objects, places, events, animals, persons, and facts that he has not yet encountered."
>
> (Gibson, 1966, p. 234)

Moreover, it may be correct to suggest that "pictures, models, diagrams and maps will do this in a way words cannot" (Gibson, 1966, p. 234). However, "the arts of language" (Gibson, 1966, pp. 234-5) and other codes are not as arbitrary as Gibson assumes, as has been argued above. If the consequences of "inadequate information" are that the perceptual system "hunts" for meaning (Gibson, 1966, pp. 303-304), then the role of social and cultural information becomes clear. Such information allows the human organism to perceive that which is not yet encountered, but more than this it allows the production of symbolic artefacts which themselves provide affordances. To say that an iconic road sign is of more "direct" significance than one which has to be read (STOP!) seems to miss the cultural nature of our surroundings. Moreover, the affordances of the latter, despite their reliance upon social and cultural information, are affordances nonetheless. Similarly, by speaking, imagining, planning and so on, the human produces things which add information to the environment. In this way, interpretation can be regarded as a socially mediate

act, in that such behaviour provides affordances for both that individual and those that perceive these actions. Such interpretations are of interest here to the extent that they provide information that becomes part of the environment and hence perceivable to others. They are important in that they comprise events that are perceived, and hence make up a large and significant portion of the human environment. Moreover, in that they reveal the 'inadequacy' of other sources of information in a particular context, they perform a useful analytical function: the production of symbolic interpretations informs us that a situation literally "affords" interpretation, rather than any more 'direct' or immediate form of action. As will be discussed below, the 'environment' of acousmatic music may be regarded as impoverished in relation to the everyday environment, but this impoverishment itself, in combination with a wide variety of structured information, affords particular kinds of activity which are not afforded by everyday objects and events in an everyday environment.

2.2.4 Acousmatic listening—perceiving acousmatic music

The approach to perception thus far suggested is in stark contrast to Schaeffer's conception of the acousmatic (Schaeffer, 1966). Rather than providing a method for concealing sounds sources, the recording, synthesis, processing and rediffusion of sounds over loudspeakers becomes a source of acoustic stimulus information for the perceiver. Such stimulus information may be structured in such a way as to specify events, regardless of a composer's intentions, and is perceived contextually. This context is provided in two ways. First, context is provided by the fact that any listener has coevolved with a structured environment. Second, context is provided by the combination of stimulus information across the perceiver's perceptual systems. The result of this first kind of context is that the listener is especially sensitive to invariants which specify familiar environmental events. The result

of the second is that the listener is not just a listener, but perceives acoustic structure originating from the loudspeakers along with a multitude of other informative sources. The result of this, discussed in more detail below, is that the perception of an acousmatic piece may be radically different from the perception of real events, but is not just *acousmatic listening*. The listener inhabits an environment rich in stimulation, rich in structure, and will perceive affordances not only through the pick up of structured auditory information from the piece but from the environment as a whole, whether acoustic or not.

In order to describe the consequences of this view consider the analysis of Wishart's *Red Bird*, made at the end of section 2.1.4. Here, an isomorphism was described between two sounds, which might lead to a semiotic interpretation. The listener must here be assumed to perceive structured acoustic information specifying the sources of these two sounds, two familiar everyday events. However, the objects specified cannot be seen or explored in the same way as a real door and book. In this sense listening is indeed acousmatic. The diffusion of the sounds over a loudspeaker system precludes such direct exploration. The objects are simply not available to be explored through touch or vision. The perception of these objects is impoverished, but only in relation to the everyday environment. The actual environment of our hypothetical listener is not, however, impoverished. Loudspeakers may be perceived, both visually and *acoustically* (Smalley, 1994), other listeners may be perceived, the programme note may be read, and the listener may perceive all these and other available sources of information. The affordances of this environment will depend upon the interaction of all these sources of information, whether perceived acoustically or not: perhaps the information may afford the production of a coded, symbolic set of linguistic utterances, perhaps a more subtle change in the listener's actions. However, the difference between the listener's present environment and that specified by the book and door sound is of importance here. The stimulus

information specifying these two objects has remained constant: what has changed is the environment of the listener. Within the acoustic structure of the piece, and within the surroundings of the listener a pair of untouchable, invisible objects are specified, which are acted upon in a familiar fashion. Whatever this affords, the listener is exposed to an artefact which cannot be 'correctly' perceived. The available information neither confirms nor denies the 'reality' of the sounding objects. However, one must be careful not to overplay the 'illusory' nature of the objects that are perceived. The book and door are only illusory in that they are perceived within a context which affords a deferral of exploratory action. Editing out the book sound and playing it on a high quality sound system behind the head of an unsuspecting subject in a quiet library completely alters the actions that one might expect to result.

The example from *Red Bird*, where clear specification of everyday events is constantly afforded, tells us little about acoustic information which seems not to specify any familiar causal event. Such situations are, however, more common than a naive application of ecological theory would propose. As Gibson himself states in response to the question of what happens in cases of "inadequate information": "the perceptual system *hunts*." (Gibson, 1966, p. 303). As noted in the previous section, where the immediate information from a particular source is insufficient the human being not only hunts for additional information from the 'natural' environment, but also from the social and cultural environment. By observing the actions of others, exploring cultural artefacts, by involvement in discussion with others, information may be explored which supplements that provided by the event or object in question. In the case of a sound or sequence of sounds which fails to clearly specify an event, the human listener attempts nonetheless to make sense of these sounds in relation to the environment. Such sounds *do* afford exploration of that environment. They afford behaviour that is social, where the involvement of others is used to provide supplementary information, cultural,

where culturally relative affordances are perceived, and aesthetic, in that their affordances may be so far removed from 'everyday' behaviour that they appear functionless.

2.3 The affordances of acousmatic music

2.3.0 Toward an ecological aesthetics?

In this final portion of chapter 2 the affordances of acousmatic music will be considered in general terms. This will raise the larger question of what an ecological aesthetics might be like. Acousmatic music, although it may 'afford' raises aesthetic issues. It is tempting to see aesthetics as something divorced from everyday experience, something relying upon the disconnection of experience from reality. Whether in terms of "disinterest", the "sublime", or "immanent critique" much philosophical aesthetics suggests that the art work remains in some sense autonomous or divorced from the concerns of the everyday world. Within an ecological approach such dislocation is always viewed as partial and contingent; relative to the perceptions and actions of an organism within a structured environment. Since the following chapter will elucidate the practical application of the theoretical notions expressed here, and Chapter 4 the broader aesthetic issues raised by these notions, the following discussion will serve only to synthesise the overall conclusions of the preceding discussion in relation to the possible nature of aesthetic affordances and related constraints upon description and analysis.

2.3.1 Aesthetic affordances

It is one thing to suggest ways in which the affordances of the objects and events of our environment are multiple, and that these affordances are largely social and cultural. It seems at first quite another to discuss the affordances of

an artwork. One might assert that a book provides stimulus information which makes sense of our surroundings, however distant, but it is more difficult to consider the distinction made between a technical manual and a copy of Joyce's *Ulysses*. In the same way, an actuality news broadcast seems quite distinct from Wishart's *Red Bird*, let alone François Bayle's piece *Grande Polyphonie*, where many (but by no means all) of the sounds eschew everyday specificity or obvious denotative and narrative significance. This gap, however, does not serve to diminish the relevance of the ecological approach. On the contrary, only by taking such an approach does it become clear why music in general and acousmatic music in particular might be considered aesthetic at all. In the everyday environment, as has been proposed, sounds are not usually perceived independently from their sources and the activities they afford. Moreover, where events are specified by acoustic invariants, these invariants allow the organism to perceive affordances that are intimately connected to survival. In acousmatic music, such direct links between sounds and our survival seem tenuous, if not illusory. Despite the obvious specificity of many of the sounds in acousmatic music, and their more extended ecological relationships, this specificity does not afford everyday behaviour. As described earlier, the contextual information available to a listener affords actions which are socially and culturally appropriate, but this does not help to explain why such cultural norms develop. There is no clearer information for the cultural nature of an acousmatic piece than opening a CD case, reading the liner notes and then playing the CD, but this does not explain why the subsequent listening is 'aesthetic'.

Why are acousmatic pieces 'meaningful' in a way that an actuality recording is not? The answer, it is proposed, lies in the simultaneous perception of two kinds of structured information. No dualism is intended here: rather a continuum between two poles. On the one hand the acousmatic piece presents structure of an everyday kind, on the other such structure is

contradicted. The first kind of structure may be perceived relative to the lawfulness of the environment, the second may contradict this lawfulness, or supplant it with novel structures whose lawfulness emerges only in relation to that piece or a specialised context. The acousmatic piece affords 'interpretation' because its affordances must be manufactured, to a large extent, by the interpretative activity of the listener. Such affordances are not however, arbitrary, any more than are the affordances of a football, typewriter or technical manual. 'Interpretation' is merely a term used to describe the production of signs and relationships between signs which provide the structure necessary for developing some form of relationship with an environment. In the case of an acousmatic piece, such symbolic structures may not result in a consistent and lawful state of affairs. The piece may afford an infinite number of interpretations, none of which exhaust or define its potential affordances. Nonetheless, the piece seems to demand an *attempt* to find an affordance structure. The listener perceives that some of the sounds specify events, or the manipulation or juxtaposition of sounds that *should* specify events but fail to do so. The aesthetic nature of the acousmatic piece lies in its position between the demands of everyday perception and its contradiction of the specificity which provides for a structured and relatively unambiguous relationship with the world.

2.3.2 Descriptions, analyses and structured information

Given that the acousmatic piece may afford the production of multiple interpretations it is important to clarify the way in which the description and analysis of acousmatic music should relate to available perceptual structures. As noted above, the affordances of a piece may be multiple, and infinitely flexible. Although at a broad level the piece affords interpretation, this does not mean that the description and analysis of that piece should attempt either to exhaust the multiple interpretations that are possible, or in reaction to this

multiplicity arbitrarily choose to concentrate upon a single interpretation.

Since the most permanent feature of an acousmatic piece is its acoustic structure, and the least contentious aspect of that structure its specification of events, whether clearly delineated as in "the sound of a bell" or as vague as "a damped collision", the description of a piece should to a large extent take these as its primary evidence and pertinent units. Similarly, the analysis, at its outset, should attempt to show how the combination of these units might be interpreted as corresponding to everyday 'associations' between them. However, both the description and analysis should take pains to show how such 'default' listening is inadequate, and how such inadequacy might afford freer interpretation. Such interpretation must nonetheless be constrained by attention to those aspects of the piece that are specified by its relationship to environmental context. Hence, the description of pitch, or pitch structure, for example, should always be made in relation to the interplay between such interpretations and the ecological backdrop against which they might be deemed appropriate. In other words, the analytical approach should reflect not the ideology of traditional music theory (see Chapter 1) but the relationship of such 'musical' descriptions to the structured information available to the listener, whether lawful in a physical or cultural sense. Moreover, where acoustic information is supplemented through its relation to particular cultural and social constraints, the descriptive and analytical process should take such factors into account. Acousmatic pieces are artefacts that are perceived in relation to the environment as a whole, not just to the narrow cultural aspects of that environment which are described by music theory: as such they should be analysed with this contingency kept at an explicit level of the discourse. Hence, frequency, loudness and time should be regarded as abstractions, and the 'musical' structures to which such parameters contribute should be

regarded as deriving from the perceptual systems' inability to gather environmentally unambiguous information[4].

In relation to visual art, Gibson notes that:

> "The structure of an artificial optic array may but need not specify (such) a source. A wholly invented structure need not specify anything. This last is a case of structure as such. It contains information, but not information *about*, and it affords perception but not perception *of*."
>
> (Gibson, 1966, p. 225)

In the case of acousmatic music similarly non-specifying structures may occur, leading to a situation where "structure as such" becomes foregrounded in a way unusual to everyday perception. Timbral descriptions of an acoustic structure, for example, fall into this category. However, it is the relationship between structure "as such" and structure providing information "about" and "of" events and objects which is important if one is to analyse an art work within the context of perception. Without describing this relationship the links between acousmatic music and everyday action and perception must remain nebulous. In order to foreground the aesthetic nature of acousmatic music it is necessary not only to identify information as such and the abstract structural descriptions appropriate to it, but also to describe the relationship between perceiver and environment which leads to the perception of information as such.

For conventional vocal and instrumental music, with its highly constrained set of sources, it is relatively easy to set aside such considerations: such music does not sound like the everyday environment. The sources of such 'musical' sounds are easily identifiable as originating within a specialised cultural domain. For acousmatic music, however, such

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[4] A sound may be described as higher or lower, rougher or smoother, brighter or darker, longer or shorter. These descriptions, being translations of visual or spatial relationships, must be regarded as metaphors. Obviously, the terms of music theory express considerable complexity through relating sounds, and expressing such relationships in quantifiable values. Intensity, or more specifically loudness (in the case of sound), cannot be regarded as a metaphorical description. Nonetheless, in ecological terms the loudness of a sound is an abstract measure of information, a measure of information which is perceived to specify distance from an event, or the forces involved in such an event's physical structure.

considerations are paramount: such music contains sounds that conspicuously specify 'non-musical' sources. It should be the role of the analyst to uncover the ways in which such everyday sounds come to have an aesthetic aspect within the acousmatic context, not to conceal such processes through assuming that once embedded in a piece such sounds become significant only through their abstract 'musical' relationships. Of course, these 'musical' relationships are as much a part of the human environment as those of everyday events: they may form 'coded' and familiar structures of a lawful kind such as the pitch structures identified by Balzano (1980; 1982; 1986). As such, they may indeed provide the listener with structure upon which interpretation is based, whether linguistic or bodily: they may afford actions.

Acoustic structure 'as such' may therefore itself afford without specifying an event or an object. However, in acousmatic music we are presented with invariances through which events may be perceived, and the significance of these events, however 'virtual', is more than just incidental. Acousmatic pieces are articulated not only at the level of differences between sounds, but also at the level of differences between the events that these sounds may specify. In assuming that only the differences between sounds themselves are significant, the analyst mistakes the acousmatic music which Schaeffer theoretically envisaged (Schaeffer, 1966) for that which may be perceived by the listener. As the analyses of the next chapter will attempt to show, acousmatic music is doubly articulated in a most fundamental sense, contrary to the mistaken assumptions of Levi-Strauss (1969, pp. 22-23), whose view of *musique concrète* is so dominated by Schaeffer's notion of reduced listening. This double articulation exists not only between information as such and information for events, but also between the extrinsic and intrinsic relationships *between* events: events specified in a piece may inform the listener about his or her environment, or about the piece itself. Through attending to acousmatic music's similarity to the acoustic structures

produced by the everyday environment, rather than its similarity to existing 'musical' structures, the analyst is immediately faced with the central problem of 'musical meaning as opposed to everyday meaning' in a way that is otherwise relegated to supplementary importance.

Chapter 3

Analysing acousmatic music within its ecological context

3.0 Introduction

Having developed a theoretical framework for understanding how acousmatic music might be described, it is now possible to apply this framework to complete musical works. The problematic nature of assuming that the *intrinsic* structure of acousmatic music has priority over the ways in which sounds refer extrinsically to the environment, and of attempting to define the units that constitute the acousmatic work in intrinsic terms alone has been addressed in Chapter 1. Through applying an ecological approach to auditory perception in particular, and to social and cultural perception in broader terms, it is possible to show how the internal and external aspects of the acousmatic 'work' relate one to another. In this chapter an attempt will be made to situate the acousmatic work within the broadest possible ecological context, taking into account not only traditionally musical issues, but also the ways in which the piece provides information about the environment, and the environment surrounding the piece itself serves to contextualise the events that occur within it. Within the framework presented in the last chapter, it is essential to analyse a piece in terms of the information it provides, and what this information specifies in terms of events. Moreover, it is necessary to come to an understanding of how the information 'in' the piece is contingent upon the environmental context in which it occurs and the relationship between the listener and that environment. Finally, in an attempt to understand the 'meaning' of an acousmatic listening situation, the specificity *and* contingency of the affordances that may arise must be addressed. In this way the relationship between listener and work can be analysed in terms of its

function within the human environment, not just in terms of an abstract and autonomous 'play' of intrinsically significant sounds.

The wider implications of taking such a functional and non-autonomous view of music meaning will be returned to in Chapter 4, in relation to the central concepts of Adorno's *Aesthetic Theory* (1974) to show how the approach advanced here both refreshes and challenges the notion of a critical aesthetics. By addressing issues of musical structure and meaning in an environmentally contingent fashion the relationship between the mimetic and rational aspects of Adorno's dialectic will be shown to have a relevance to contemporary musical culture far outstripping that assumed by many commentators (e.g. Paddison, 1991). Before this can be illustrated, however, it is necessary to observe the consequences of such a view in relation to a particular piece of acousmatic music.

Although reference will be made to a number of works in this chapter, the primary focus will be a three minute long piece by Yves Daoust entitled *Mi Bémol*. **(CD example 1)**. This piece, as will become clear, reflects many of the issues which have been discussed up to this point and should be regarded as an appropriate choice for a case-study on this basis. Moreover, its brevity allows for a level of detailed discussion which might be impossible for a longer work. The analytical work presented here should not be regarded as exhaustive. Indeed any 'closure' of meaning is in stark contrast to the openness and flexibility of meaning implied by the ecological approach to perception described in the previous chapter. However, the analysis will show how the multiple sources of information available from a listening situation may specify events, and how the perception of these events produces both constraints upon interpretation and the possibility of infinite re-interpretation. Despite the seemingly behaviourist slant of much research in ecological psychology, the actions of the listener allow for continual realignment *vis-a-vis* the work, in relation to a constantly changing relationship with the broader

environment: the listener is not merely a passive receiver, *stimulated* by the work, but an explorative organism, sensitive to information from both the work and the wider environment. As noted in the previous chapter, ambiguity, or under-specificity of information leads to a search for meaning: the acousmatic work in question both specifies events *and* places them within a context in which their behavioural implications are unclear. The *tension* that exists between intrinsic and extrinsic significance, intrinsic and extrinsic contexts, and the many different sources of information which come to constitute experience of the work, do not suggest a positivist closure of interpretation. On the contrary, these tensions and ambiguities reveal the way in which the 'natural', 'cultural' and 'social' environments come together in the perception of a work not to produce certainty, but to produce individual and contingent interpretations, which are nonetheless constrained and informed by available sources of information.

3.1 Analysing *Mi Bémol*

3.1.1 Real and virtual environments

Listen to **CD example 1:** it is clear that the sounds we hear, regardless of whether they inform us about 'natural' events or more culturally specific events such as linguistic utterances or motivic structure, inform us about two kinds of environment. In the first instance the sounds of the piece serve as information for the *real environment*: although we hear sounds that have no visible sources it is clear that many more or less ambiguously defined events are specified by the acoustic structure of the piece. These events may not be perceived to occur in the listening environment itself, whether in a private space or a concert hall, but they can be clearly perceived to have their origins in *a* real environment as they preserve familiar and lawful relationships

between events and acoustic structure. In the second instance, the sounds that we hear specify events within a *virtual environment*. In this case the sounds serve as information not for external events, but as the constituent elements of an intrinsic structure.

There are three main sources of information relevant to this distinction. First, it is clear that the listener's relationship to these sounds is made within the context of 'musical' listening. The listener contextualises the sounds through the actions of putting on a CD, entering the concert hall and so on[1]. This recontextualisation *by* the listener implies more than just a simplistic 'aesthetic stance' towards what is heard. The listener places the sounds within a context in which recorded sounds are going to be heard, sounds that by definition have already occurred, and which specify past events if they specify events at all. Our familiarity with the transforming technology of the CD player is just as potent and defining a source of information as the sounds which are thus transformed. Second, and more importantly, many of the events do not normally occur within the kinds of environment which constitute a listening space, and hence cannot be considered to be lawful in relation to this space. Consider, for example the sounds of the outdoors which are to be heard in the piece, and the effects of a mismatch between the acoustics of the listening space and that of the recorded environment. The sounds of children playing **(CD example 2)** do not just inform us about 'children playing' but about the acoustic space in which they play: the open air as opposed to the living room or concert hall. Third, the events specified by sounds in the piece do not follow an environmentally lawful pattern: the human listener remains stationary within a listening space, whilst events occur together which would imply many different environments: the outdoors; a firework display; the countryside. Sounds "fade in" in a way quite impossible in the 'real' world, and are recognisable yet clearly transformed or recombined

[1] As noted in the previous chapter, the diffusion over loudspeakers of a sound itself provides information that informs the listener of the 'unreality' of presentation.

in unlikely juxtapositions and superimpositions. Hence, the events specified through the acoustic structure of the piece can only be regarded as information for a past or historical environment, one which is in this case multiple and in itself unlawful in relation to the listening space and any single historical environment. In this sense the sounds of the piece present events which are part of a *virtual environment* which contains events which may have occurred in the real environment or could do so in future.

However, these events inform us not only about the nature of a 'historical' environment, by virtue of their disconnection from the environment in which they are heard, they also inform us about the real environment in a more immediate fashion. Consider **CD example 3**: here amongst other things are the sounds of a firework display followed immediately by a thunderclap. These sounds do not just specify events which have occurred in the past: they specify events which have continuing relevance to the human listener. A recorded thunderclap and a succession of firework explosions have familiar cultural connotations, they are *used* to specify culturally convened events. Fireworks are associated with celebration, with festivity, the thunderclap with the unpredictable forces of nature. One can choose to ignore previous experiences of these associated events but one cannot deny their familiarity. The thunderclap or storm is constantly drawn upon as a symbol of fate or nature in literature and film and listeners are no doubt familiar with this conjunction from their previous perceptual development, just as fireworks cannot be realistically separated from their celebratory function in the human environment.

These events are not merely dissociated from their causes by their acousmatic re-presentation: by virtue of this dissociation attention is drawn to their role in the cultural environment. One cannot, and need not, hide or shelter from the thunder and rain, nor can one enter into any celebration as these events are not directly available. Instead, the listener is only able to

make sense of these events as information for storms and festivities in general, and may therefore attempt to interpret the cultural significance of their presentation without the necessity of overt action. This interpretation, if it occurs, is not merely a historical matter as it may lead to changes in the future activities of the listener in relation to these events. For example, the juxtaposition of these two explosive events might lead the listener to consider their *relationship* and to observe thunderstorms in relation to firework displays: the 'firework' might become seen as an artefactual copy of the 'thunderclap'. Despite the recorded nature of these sounds, the events they specify are more than just empty representations of situations that have occurred. Their affordance structure is transformed by both the technological process of recording and diffusion, and by their juxtaposition within the piece. *These* fireworks and *this* thunderclap are not perceived as having relevance to the relationship between listener and local listening environment but as having a broader interpretative relevance to the listener. By virtue of their inexplicable relationship to the listening environment they do not immediately afford social or individual action: to enter into a celebration or to take shelter. In one sense one could claim that the listener is drawn into an abstract relationship with them, in that their actions have little immediate importance as regards survival or appropriate social behaviour. However, this relationship is not abstract in any strong sense: the events specified do occur in the everyday environment and their interpretation 'within' the piece cannot be separated either from their everyday significance or from the possible changes that may be wrought in this significance for the listener through their presentation in a dissociated and recontextualised form. The real environment *outside* of the specific environment of the listening space does not disappear for the listener. It is this *persisting* environmental context which the piece informs us about, not just what the listener can perceive of his or her immediate surroundings.

Just as the re-presentation of such real events serves as information about the real environment, these events may also constitute aspects of the virtual environment. The juxtaposition of the thunderclap and firework explosions not only points beyond the piece but also leads to the possibility of interpreting these events as being analogous to musical structures. One might speak of the thunderclap providing a structural link between the preceding section (fireworks) and the following section which specifies events common to the countryside (**CD example 4**). The thunderclap shares certain properties with both: on the one hand it is an 'explosion' on the other a natural rather than artefactual occurrence. The virtual environment may thus draw upon everyday events to suggest intrinsic relationships between sections of the piece.

The real and virtual environments discussed above form the two aspects of structure which will be addressed below. In order to clarify how these environments are structured it is necessary to proceed to a more detailed level of analysis. In the following three sections the coexistence of these two environments will be examined using the following oppositions. First, a more detailed analysis of intrinsic and extrinsic structures will be given (section 3.1.2). Second, the relationship between different real environments and the contexts they afford will be examined (section 3.1.3). Finally, the ways in which real and virtual environments interact to form more complex chains of relationships will be addressed (section 3.1.4).

3.1.2 Extrinsic and intrinsic relationships

Whilst listening to an acousmatic piece, events are more or less ambiguously specified, and relationships between these events are perceived. Those relationships which pertain to the real environment are to be termed extrinsic, and those that pertain to the virtual environment, intrinsic. In the case of *Mi Bémol* some of the events are extremely familiar, if not banal, and some are

extremely unfamiliar, to the extent that they can hardly be deemed to be "specified" at all. Clearly, it would be mistaken to force these extremes to fit into any naive definition of "ecological pertinence" (cf. Windsor, 1994, discussed above in section 2.1.4): such an attempt would deny the mutuality and flexibility of perception. Instead, an attempt will be made to describe how a number of intrinsic and extrinsic relationships may be found, whether by virtue of relationships between events, or by virtue of relationships between 'information as such' (see section 2.3.2). An attempt will be made to focus on the former, following the theoretical reasoning offered in Chapter 2, but where an acoustic structure seems to offer little information regarding the environment, the analysis will begin to focus upon more abstract relationships. As will become clear in the following section, many of these abstract relationships are in fact better described in relation to our familiarity with traditional musical structures, or rather the 'musical' environment, and are no less grounded in event perception than those with clear everyday sources. Here, however, the focus will be upon the banal rather than the traditionally musical, and upon the way an interpretation of the piece might arise through the specification of everyday events, and the continuum between information for specific events and information as such. Similarly, relationships will be explored as much as possible with reference to the lawfulness of the real environment. Only where such lawfulness is clearly contravened within the acoustic structure of the piece will alternative structuring principles be suggested. Here too, through focusing upon the familiar, it will become clear that prior to any explicitly 'musical' interpretation of events, a complex and wholly aesthetic structure begins to emerge. It is not argued that these relationships are the defining features of any "ideal listener's" representation of the piece's structure (cf. Lerdahl and Jackendoff, 1983): rather, these relationships are intended to be suggestive of the kind of pertinent units and

structures analysts might begin to focus upon within an ecologically motivated framework.

First then, intrinsic relationships will be considered: those that seem to connect one section of the acoustic structure of the piece to another. Focusing at the shortest time scale, one should consider how it is that the smallest units of the piece come to be perceived as distinct and unitary. The opening sounds of the piece seem immediately to specify an instrument which, although unusual, is certainly coherent. Since this instrument, and the sounds it seems to produce recur throughout the piece it is worth spending some time exploring its structure in detail. **CD example 5** comprises the first sounds of the piece, and as will be suggested, the first *event*. In one sense, the repetition of these opening sounds provides the criterion for considering each of the repeated sounds (**CD example 6**) as a unit. However, the criterion chosen here is that the acoustic structure of CD example 6 specifies a single event, a series of metallic, bell-like impacts, as if an object were being struck: one could subdivide this event into smaller events, but the temporal structure of the series of impacts links them into a coherent, source-specific higher-order event. This temporal structure clearly specifies a decaying, bouncing form of event, similar to the synthesised bouncing event manipulated by Warren and Verbrugge (1984). This temporal coherence is important, since it serves to connect the impacts in an ecologically lawful manner. **CD example 7** follows the development of this event and the introduction of a another clearly unified event in the left portion of the acoustic space of the virtual environment. The development of the first event specifies a single 'instrument' playing a short sequence of different pitches: in other words the acoustic information specifies that the original struck object is not only a single object, but a collection of objects of similar composition but different sizes. In this sense some form of instrument is suggested: the repeated striking of the same sequence of constituent objects does not suggest an inanimate set of objects being struck

randomly (for example, a set of chimes being blown by the wind) but something that is intentionally 'played' by some agency: perhaps mechanical, perhaps a human player. The precision does not suggest the latter, but the melodic structure (returned to in section 3.1.3) certainly hints that a human source is likely. The events which occur in the left portion of the virtual environment literally mirror those on the right, albeit with a time delay. The temporal relationships between these two sequence of events directly specifies two instruments, one on the listener's right, and one on the left. The important point to note here is that although a musical interpretation, explicitly involving pitch and rhythmic structure could be found for these sounds, their coherence, distinctiveness one from another, and identity can all be explained in terms of the virtual events about which they inform the listener .

Rather than stay at this detailed level, and continue to suggest ways in which individual events come to be specified and distinguished, a number of more global relationships will be explored. Although it is important to analyse the local level at which sounds come to be related and distinguished by virtue of the events that they specify, this more global analysis will reveal intrinsic relationships which define the virtual environment in a more extended fashion. The opening event's structure, and events which seem to originate from the same 'instrument', recur throughout the piece. Sometimes these occurrences are transformed by studio techniques in such a way that a peculiar relationship with the real environment is suggested: if this 'instrument' is an environmentally lawful one, and despite the combination of 'striking' (which seem intentional or controlled by some agency) and 'bouncing' (which seems less similar to the behaviour of a 'played' musical instrument) this seems reasonable, then its transformations suggest that the virtual environment of the piece in which this instrument appears is not lawful in the same sense as the real environment. Consider **CD example 8**, which directly follows on from the segment presented in the previous tape example. This sound seems to

originate from the same source as the preceding examples. With a familiarity with the techniques of sound manipulation it is easy to perceive that our 'instrument', or an excerpt from its playing has been reversed, especially through being able to un-reverse the excerpt using digital techniques. Despite this the original instrument is still specified through the timbral, bell-like quality of the sound. This cannot occur in the everyday environment[2], and immediately informs the listener that the virtual environment is not going to behave in an entirely expected fashion. Regardless of whether a listener 'recognises' the studio manipulation, it is clear that we are not perceiving a recording of some unmediated reality. The intervention of the virtual nature of the piece is here specified. The modified event, and its original are immediately juxtaposed, and seem to share some aspects of causation (a similar material is excited). These two events, despite their differences, can be perceived to be connected in some way, through sharing an aspect of their causation, a common source. They seem to specify the same virtual environment, defined in terms of which sound sources exist within this environment.

More globally still, each time the original 'instrument' is heard, the coherence of the virtual environment is reinforced. It is not so much that the sounds of this 'instrument' are associated, more that they seem to share a particular virtual environment in which this instrument is played. However, as the piece continues it becomes clear that a number of such environments are specified: these too seem to share certain aspects, but do not necessarily form clear *everyday* relationships with the original environment specified. In this way the virtual environment of the piece may be perceived to specify a number of sub-environments, each containing events which originate from similar possible real environments. Each of these sub-environments may be considered to be both distinguished through these differences, and yet made to

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[2] It can, however, obviously occur in the environment of the sound studio.

appear related through their origin in the overall virtual environment of the piece.

Which sub-environments may be identified, and how does this interplay between coherence and fragmentation manifest itself? We have already considered the 'instrument' which opens the piece. This forms one sub-environment, which recurs in combination with other environments throughout the piece, encouraging coherence. Moreover, the events of this environment have a number of intrinsic connections with other events specified through the piece. For example, a number of its recurrences seem to initiate the onset of new sub-environments. This process is more than just a juxtaposition of the motive with the beginning of a different sub-environment. Consider, for example, **CD example 9**. Here, a version of the initial 'instrumental' event, assisted by some supplementary 'impacts', seamlessly provides what in musical terms could be considered an anacrucis to the following sounds, which specify the chanting of a crowd. The temporal structure of the initial event seems to imply a continuation, perhaps through the excitation of a new event. It is not suggested that any listener would perceive the chanting of a crowd to be 'caused' by a continuation of this temporal structure. Nor is it suggested that this relationship may be explained entirely in terms of an environmentally lawful sequence of events (see section 3.1.3). However, the acoustic structure of the 'instrument' event does provide structured information which leads one to expect some terminal event. In this case the event is not another 'instrumental' impact, but the initiation of a new sub-environment.

In a rather different way, the mere fact that this 'instrument' recurs during sections dominated by contrasting events forms a simultaneously fragmenting and unifying role. Its presence suggests that the virtual environment as a whole shares a degree of environmental specificity, regardless of its multiple nature. On the other hand the juxtaposition and

superimposition of this environment with the others specified in the piece informs the listener that what is heard cannot be mistaken for a mere actuality recording, just as the transformations of any specific event within this environment suggest another form of mismatch between real and virtual environments as a whole (see above, in reference to **CD example 8**): listen for example to **CD example 10** during which the instrumental environment is heard throughout, superimposed over sounds that specify rain, bird-song, cattle, and the playing of a plucked instrument. The original 'instrument' serves both to distinguish this from a recording of a real environment, and to provide a link with the virtual environment as a whole. Moreover, it seems to produce some form of link to the plucked instrument. This latter relationship will be analysed in more detail when the relationship between 'musical' and 'everyday' environments is considered in the next section. It suffices here to note that the instrumental nature of the two event sequences, the relationship between what seems to be two intentionally produced events, cannot be ignored.

Leaving aside the initial events of the piece, and their relationship to other sub-environments, it is clear that a huge number of specific events may be heard, each leading to similar relationships of fragmentation and coherence on this intrinsic level. Consider, for example, the specified events of **CD example 11**: in terms of a timbral description of this extract one might be tempted to state that a number of unrelated sounds had been superimposed. However, the cyclic metallic squeaking could easily be produced by the squeaking of a playground swing. It is not suggested that this is the only way to hear this sound. However, in this case such an interpretation provides a link with the sounds of children playing, despite the artificially foregrounded nature of the swing. The question of whether such a relationship is *imposed* upon these two sounds or *specified* by their interaction will be discussed in section 3.1.4. All that is required here is to suggest that as soon as one

considers these sounds not as abstract timbres but as information for events, a shared origin in the real environment is made possible which implies a connection within the virtual environment. One should also note that the rather curious acoustic perspective, the 'swing' sound being louder and seeming artificially close to the listener compared to the actual 'playground' sounds, seems to simultaneously call this relationship into question. It should be added at this point that no claim is made that this is the only interpretation of these events. All that is intended here is to show how considering environmental specificity can draw a listener, in this case myself, into making some form of lawful interpretation of an artefactual and virtual environment.

Perhaps more interesting than this banal relationship is the relationship between this 'swing' event and its later appearance (**CD example 12**): here the temporal structure of the swing event is combined with a number of acoustic structures which mimic its cyclic, repetitive nature, not its precise source: a short melodic fragment, the sounds of fireworks (or are they big guns) all seem to follow the same cyclic temporal structure. Clearly the cause of these sounds could be related in terms of the kind of 'gesture' which seems to govern their amplitude envelope and precise reiteration. However, whereas a swing, the movements of which are necessarily pendular and repetitive, lawfully produces such an acoustic structure, the sounds with which it is combined cannot be regarded in the same way, despite this similarity. Nonetheless, such a relationship is specified by this superimposition, showing the distinction between the real environment and the virtual environment of the piece. Again, this relationship will be returned to in a different light below.

A relationship of a similar kind seems to obtain between each firework explosion and perhaps the least easy sound to regard as having a clear relationship to an event of some kind. The 'falling' gesture of **CD example 13** could be said to originate from some form of instrument or object, but it would be much more reasonable to suggest that is *resembles* the sound such

an object or instrument might make. If anything, this sound seems to originate from a hybrid source, part percussive (miniature pitched chimes), part specifying some form of falling object by virtue of its descending pitch, although this latter explanation verges towards the more speculative. Undoubtedly, some falling objects do produce such a gradual fall in pitch: for example, shells and fireworks. Listen now to **CD example 14**: here we do hear the sounds of fireworks, aided by the spoken dialogue, or perhaps the sound of big guns firing: the exclamations "fire", "...there's a double one" and "O wow, look at..." seem to contrastingly specify one or other environment. Towards the end of the example a precise restatement of the 'falling' gesture recurs, clearly resembling the gestural qualities of the fireworks. Whether or not this leads one to perceive the falling gesture in a more environmentally directed fashion, its presence here serves to form a link between its earlier statement and the present section. Whether one can speak of a shared environment here is open to question, but the coherence of the virtual environment certainly seems to be added to. Here, an ambiguous sound (in event-specifying terms), in Gibsonian terms "information as such", comes to be presented within a virtual environment which serves as contextual information. The role of such contexts will be returned to in the following sections. Here it is important to note only that the virtual environment specified by the piece is dynamic and evolves over time, encouraging constant reassessment of what the acoustic structure is information *for*.

There are many other intrinsic relationships this analysis could describe and discuss. Rather than continue in this vein, however, attention will now be paid to the relationship between the acoustic structures of the piece and the real environment of the listener. As above, an attempt will be made to focus upon the banal in terms of the events isolated, and to *suggest* some relationships between these events and an environment. As noted in section 3.1.1, this real environment need not be confined to the present environment

of the listener. Instead it comprises the listener's persisting surroundings and the 'natural', 'social' and 'cultural' structures which it contains.

Firstly, a return to the 'instrument' events which open the piece is valuable in that it clarifies the 'double articulation' of acoustic information (see section 2.3.2). Just as the unitary nature of this 'instrument' forms the basis for defining a particular virtual environment, it simultaneously serves as information for the real environment of the listener. As already noted above, a degree of intentionality is specified by the acoustic information, offset by the mechanical precision of the 'playing', and also by the unusual and unfamiliar combination of bouncing impacts upon the 'instrument' and its similarity to some form of tuned percussion instrument. The real environment of the listener is directly specified by these sounds: the physical structure of objects and their interactions, and the familiar and more specific environment of musical instruments are both present within the relationship between listener, acoustic structure and the everyday environment. In more general terms consider the following sources of information and their relationship to the everyday environment: a firework display, as discussed above, speech events (both children's voices and news reports and interviews), outdoor events (animal sounds, weather sounds). All these sources of information may serve as information for the virtual environment of the piece, but simultaneously serve as information for a real environment, which although not immediately available, is lawful and persistent for the listener.

Consider in more detail exactly how some of the speech events of the piece inform the listener about the real environment. It is obvious that speech information richly specifies according to a shared cultural environment. Here, in a rather more complex fashion, some of the speech sounds do much more than provide some form of simple narrative. **CD example 15** contains information for three real speakers, distinguished by gender, and perhaps more importantly by their social role. Only two of these speakers can be understood,

one clearly specified as a radio or television journalist or news reader, one as an interviewee. The third speaker, although unintelligible, has a similar provenance. In historical, or documentary terms, it is clear that at least one 'news item' is both reported and commented on by the two intelligible speakers. Specific external events are clearly specified here, both through the specific coded content of the utterances, and by the more global features of the discourse. One speaker follows the conventions of a journalist, describing an event in disinterested terms, the other refers to it as a participant. Geographical information is provided: it is clear through the accents of the speakers that the events described occurred in North America, just as it is clear through the unfamiliar language employed to refer to events. No attempt will be made to interpret the 'meaning' of these speech events any further here. What is clear is that acoustic structures inform us about real external events in a documentary fashion.

Supplementary to this documentary role, however, is the more immediate role of such explicitly extrinsic structure. The listener is informed about past events (unless the listener regards this past as artefactual, as a 'fake') but is also informed about his or her real environment. The very unfamiliarity of the reported incidents leads the listener into an attempt to search for environmental structures which correspond in some way to those specified. This search is not necessarily manifested in overt exploration, but could equally be manifest in a search for contextual information contained within the piece, repeated and directed listening during which cultural implications are attended to. Alternatively, the listener may be drawn into overtly interpretative actions which serve to remove ambiguity from this information, through exploration of their own external environment. This latter course will be returned to below. What is important to note is that whether or not the listener reaches a final understanding of what the speech sounds 'really' specify, they lead the listener into a relationship with the

cultural environment, and not just as information for past events. Speech sounds not only specify by virtue of our shared familiarity with a cultural and social environment, they also specify a particular cultural environment as a perceptual context. Not only are a number of events specified by the speech sounds here, but also the possibility of attempting to interpret these events through further exploration of our own cultural environment. Clearly, one cannot revisit the documented events themselves, but one can, through further exploration, attempt to form an understanding of them through exploring the cultural traces these events leave behind them, of which the re-presented broadcasts here are only a preliminary and ambiguous example.

Clearly, when listening to the piece, the real environment is re-presented to the listener, and events, whether actual or 'virtual' in their environmental origin, inform us both about the environment which is thus documented, but also the real environment in which we continue to perceive and act. Rather than continue to address extrinsic reference as if the real environment was common to each and every listener, an attempt will now be made to focus upon the differences between listeners' environments, and distinctions that may be drawn within a single listener's surroundings.

3.1.3 Subjectivity and environmental contexts

The preliminary analysis presented above relies upon a number of assumptions about the real environment: that it is lawful, that such lawfulness allows for direct perception and that to a large extent much of this environment is shared by listeners. However, listeners do not inhabit the same environment, and an individual listener may be familiar with a number of relatively distinct environments. Both of these factors lead to the possibility of multiple interpretations of acoustic information.

Consider, for example, comparing my own interpretation of the speech sounds heard in **CD example 15**, with other possible interpretations in terms

of my own environment and that of another, imaginary listener, inhabiting a similar but subtly different environment, and taking rather different interpretative actions in relation to that environment. If one assumes that both of these listeners are familiar with radio and television news broadcasts, then at this level at least the analysis offered above seems reasonably intersubjective. If however, I was to state that both intelligible speakers are referring to a single event, a relatively recent event which occurred in Canada, and that this event involved the issue of ancient land rights for North American Indians, and more specifically a violent clash between police and protesters over such issues, then this is clearly a rather less obviously intersubjective interpretation. The issue here is not whether this new interpretation is more or less accurate, or whether such accuracy has aesthetic value, but upon what grounds such an interpretation can arise. Moreover, this discussion is intended to dispel any assumptions there might be about the relative merits of *subjective* and *objective* interpretations of the events specified in a piece.

Where does this interpretation come from? The acoustic information within the piece does give considerable information regarding where the reported events may have occurred, and it is clear that some violent disturbance happened "over a golf course". In order to get from this information to the narrative described one might suggest that the interpretation is made through piecing together incomplete information and producing a logical (in everyday terms) narrative which fills in the gaps. However, this is not necessarily the case. Why American Indians, and more importantly, why Canada? To claim anything but an arbitrary choice here would be misleading. The logic of the interpretation does not require such a choice, and I might equally have chosen the United States, where Amerindian land rights have received considerably more international press coverage. Similarly, although land rights have been offered as a logical cause of a conflict between police

and protesters, why not some other issue: and why Amerindians rather than some other minority group who also burn "tobacco" at sacred ceremonies. Any listener might have arrived at my interpretation in search of a lawful sequence of events, but why this particular interpretation? The answer of course, is that different listeners exist within environments which are defined mutually, by the relationship between the environment and the listener's actions within that environment. The information that I utilised in forming my interpretation was 'available' to many listeners (in the UK at least): a television programme which described the specific events outlined above. Similarly one might expect many Canadian listeners to come to this interpretation. However, this was only one source of information which may have been relevant: the CD on which the piece appears originates in Canada, the composer is Canadian, and these items of information are available from the sleeve notes accompanying the disc.

Most importantly, however, this interpretation is neither subjective, nor objective, in the sense that arises from the previous chapter's theoretical explanation of how interpretations arise out of a mutual relationship between environment and organism. I do not intend to give an exact protocol of the stages in which the interpretation came about because such a protocol *would* be of limited value in terms of its generality. It is the fact that a specific environment, and a specific exploration of that environment came into play as a context within which to interpret the acoustic information provided by the piece which should be noted. Another listener, might not share this environment exactly, nor explore it in the same way, but *might* do so.

It could be argued that this example of the contingent nature of the relationship between listener, virtual and real environments, dealing as it does with linguistic information is not representative of the more general, non-linguistic information which is available from acousmatic works. Clearly, however, non-linguistic information is just as contingent upon the

environmental context which the listener has explored, or may explore in the future. To take an extreme example, a listener who has never perceived a child's swing would fail to perceive any connection between the sounds of children playing and the pendular, cyclic squeaking which specifies a swing. Moreover, even if such an 'association' has been perceived in the real environment, there is no logical need for such a relationship to be perceived within the virtual environment of the piece. Nonetheless, it is argued, such relationships are available to listeners that share such aspects of the real environment.

Consider now the difference between a 'musical' and 'everyday' interpretation of the events in the piece. It is not suggested that all perceptions of a piece occur somewhere on a continuum between everyday and musical interpretations of events. Rather, the distinction between different environmental contexts is at issue: 'everyday' and 'musical' environments can be considered two of many possible subsets of a listener's overall environment. Here, such sub-environments are defined in a similar way to the virtual and real environments considered above. The 'everyday' and 'musical' environments are distinguished by differing kinds of lawfulness. The musical environment is defined by, for example, invariant pitch structures (see e.g. Balzano, 1980; 1882; 1986) which have little relevance to everyday perception. As noted in Chapter 2, 'everyday perception' may be defined in opposition to the kinds of structured information which seem important to music perception (see Gaver, 1993, discussed above in section 2.1.3). Here, no assertion is made regarding any epistemological distinction between musical and everyday listening: just as a car mechanic will be sensitive to structured auditory information which another perceiver may simply regard as 'engine noises' in order to diagnose faults in a mechanical system (Gaver, 1993) listeners may develop differing sensitivity to musical invariants. More importantly, acoustic structures may provide invariants which specify both

everyday events *and* musical events at the same time. This is analogous to a situation in which a car mechanic might respond to the acoustic structures produced by an engine in order to repair that engine, or to distinguish between different cars in some aesthetic sense. The acoustic structure of musical 'events' is always perceived in a dual fashion: the perception of what it is that is played (an instrument), of the body that is playing, and the space in which a musical event occurs is not specifically 'musical'. Simultaneously, however, listeners may attend to structural features of the music, such as harmonic and rhythmic closure, motivic variation and recapitulation, metrical structure: these kinds of acoustic structure, although produced by the efforts of a body upon an instrument are less easy to define relative to 'real' events. Can one consider a musical motive an 'event', for example?

'Musical' events, in the context of acousmatic music, are not necessarily defined according to their similarity to conventional musical structures. However, within the experience of listening to an acousmatic piece, musical and everyday environments play an interactive role in defining the virtual environment of the piece. In the previous section the connections between various distinct sub-environments were considered on the basis of their coherence as everyday events or sequences of events. However, the opening events of the piece may also be analysed relative to the structure of the musical environment. Considered in this way, the opening events of the piece are a motive with a tonal centre of Eb, which serves as a structural unit which provides musical coherence. Note also that many of the sounds of the piece (such as the falling sound related to the firework section above) seem to form clear and directional pitch relationships with this motive itself, and with the implied tonal centre of Eb. The opening motive also seems to behave almost as if it was a sonata-form subject, returning clearly at the end. One might even suggest that the second subject of the work is the everyday environment, contrasted with a 'musical' first subject, and that the

recapitulation brings these two environments together through plucked instrument melody which enters towards the end of the piece. The original motive is also subject to pitch and rhythmic variations, suggesting a development section in the central portion of the piece. In order to perceive these relationships, the acoustic structure of the piece must be heard within the context of a musical environment, one which contains structured events, but where these events have no clear everyday significance. Of course, musical structures may inform us about the everyday environment, for example through their relationship with social and cultural structures (see e.g. Agawu, 1991), and everyday events may be perceived to have little relevance to immediate actions in the real environment, as in the dislocated perceptual context of the acousmatic piece. Hence, no clear line can be drawn which divides musical and everyday events. However, the interaction between everyday and musical events is certainly important to an ecological approach to this piece: the 'traditional' notion of musical coherence is combined with relationships which rely upon our familiarity with the everyday and 'non-musical' environment: in this way traditional musical units become just another source of information, lawfully structured, specifying aspects of both real and virtual environments. The *affordances* of both musical and everyday events are transformed within the piece: just as a direct relationship with the everyday environment is transformed by the structure of the piece and its listening context, so too the conventional musical environment is transformed. Musical events are no longer just information for the structure of a piece, or for locating this piece within a social and cultural context, but become information for the real environment of sound producing objects: through juxtaposing musical and everyday structures, the status of both is called into question. Just as we may be led to perceive an everyday sound as having musical qualities leading to a musical structure (the virtual environment) we may be led to perceive a musical sound as having everyday qualities. To

return to the opening events of the piece, the sounds that are presented are at once a musical motive, and information for a sound producing event. Both of these descriptions may lead to the formation of relationships within and external to the piece, and both rely upon our familiarity with aspects of the real environment. By juxtaposing and superimposing musical and everyday sounds the boundaries between the distinct environments which these derive from become blurred: the virtual environment of this piece makes no intrinsic distinction between these two types of event, leaving the listener within a context that is neither everyday, nor musical.

Having noted the multiple contexts within which the piece may be perceived, some deeper theoretical consequences should be addressed. It is one thing to suggest that rhythmic and pitch relationships may be found that may be perceived in relation to the traditional musical environment. However, what does this imply about the two of the most often identified musical domains within acousmatic music: *gesture* and *timbre*. It was argued in Chapter 2 that gestural and timbral descriptions of acoustic structure were metaphorical, and that event-related descriptions should be regarded as having analytical priority, although not in an exclusive fashion. Moreover, it was suggested that gestural and timbral descriptions reflect attention to information as such, as opposed to information for events, and are hence appropriate only where impoverished information existed upon which to perceive in an event-related fashion.

This being the case, some reconsideration of the distinction between information as such and information for events is called for. If attention may be focused upon the everyday attributes of musical events, and the musical attributes of everyday events, then it would be incorrect to maintain that a gesture, a motive, a timbre or a temporal structure must be interpreted as being information as such. Within the context of the musical environment, within which humans interact with musical instruments, sing, and listen to and

respond to musical events, such structures are clearly far from abstract. Although it is hard to point to a musical event in the same way one might identify a more obvious environmental occurrence such as the movement of a child's swing, musical structures do provide information about the environment. This suggests that the distinction between information as such and information for events must be regarded as contingent upon whether a listener perceives an acoustic structure in relation to an environment in which events are specified reasonably clearly. If attention is focused upon the everyday kinds of events which might form some type of narrative structure, then a gesture or timbre which fails to integrate within such an environment may indeed be information as such. Conversely, however, where a musical environment is being more clearly specified such sounds cannot merely be regarded as information as such. A listener *may* attend to the so-called 'sensuous' qualities of sounds, but in most cases such attention is hard to disentangle from the perception of some form of environmental context. The relationship between information as such and information for events is a dynamic one, and can only be made in relation to the context within which perception occurs.

To illustrate this, consider once again the *dynamic* status of the 'falling' gesture discussed above in section 3.1.2: this acoustic structure may be considered as information for a musical environment, as information for an everyday environment or as information as such, depending upon its position within the intrinsic context of the piece and the extrinsic contexts with which it becomes linked. It is a motive, or a synthetic firework, and if neither of these, and only then, an abstract sound which might be interpreted in 'sensual' terms. If the latter, then it is clear that only by bringing it into some relationship with the real environment can one describe 'what' one hears, however metaphorically.

Information as such is no less valuable in any aesthetic sense, but it is important to remember that such aspects of information are perceived in contrast to event perception. Sensuous perception is a tenuous and personal experience, and once one attempts to bring such experience into the social realm, through description, metaphor results. One is forced to describe sounds as higher or lower, rougher or smoother, brighter or darker. Herein lies an important feature of the ecological approach to description: despite the attraction for music theorists to attempt to divorce musical experience from everyday experience there is a dynamic interplay between sounds and the environment, through which even the most supposedly abstract sounds are perceived in relation to the environment which produces them. The *contrast* between information as such and information for events is always a defining feature of the interpretation of acousmatic music, and should not be explained away by denying the value of either end of this continuum. A description of information as such should always be made in relation to event perception: although information for events has been concentrated upon within the present thesis as a corrective measure (see Chapters 1 and 2), there is no reason why research into acoustic structure itself may not prove fruitful in explaining certain aspects of acousmatic music (e.g. Wessel, 1979). However, on its own, such work fails to do justice to the dynamic nature of the perception of acousmatic music. Although one might wish to classify the relationship between the 'swing' sound and its development (**CD example 16**) as an abstract relationship based upon information as such one can equally retain the swing sound's event specificity in one's interpretation, interpret the 'development' in relation to familiar musical structures, or attend to the 'quality of the sounds' themselves. One might interpret the development of the 'sound itself' as creating a continuum between the event specified and certain aspects of the *information* for that event being developed independently of the specified real environment. Alternatively, one might

perceive a transformation between everyday events and musical events (swing to rhythmic/pitch structure), with information as such (the temporal and frequency structure of the sounds) providing a common factor. Here of course the contingency of any particular interpretation should again be noted along with the additional proposal that such contingency applies to the listener's attention to information as such. Any attempt to define what *is* or *should* be heard within the acousmatic piece founders upon this contingency. Despite the specificity of events within the virtual environment of a piece, it is inconceivable that an analysis could predict the various interpretations possible in relation to this virtual environment and the persisting real environment. Hence, the following section will focus not upon how any listener might come to settle upon a particular interpretation in response to such diverse sources of information and courses of exploration, but upon some suggestive examples of the kinds of interaction between these sources which produce distinct interpretations at both local and global levels.

3.1.4 Interactions between intrinsic and extrinsic structures

In the previous section the relationship between information as such, information for events and the different contexts in which perception occurs was examined. Here, a rather different effect of context will be examined. Since sounds serve as information for both real and virtual environments, this dual role has important consequences for the perception of the piece as a cultural unit. Up to this point, the acousmatic piece has been described in terms of 'what' is perceived, whether events, relationships between events or as information as such. However, little has been said about the cultural significance of perceiving these occurrences: despite the attention paid to the cultural environment nothing has been said regarding the piece itself except that it is a virtual environment which draws upon, but also challenges the lawful nature of the real environment. Before dealing with the difficult notion

of affordances in relation to the piece as an aesthetic rather than everyday object, it is necessary to show how real and virtual environments conspire to produce 'meaning' in its broadest sense. Moreover it is necessary to illustrate not only that the acousmatic piece is contingent upon intrinsic and extrinsic structures, but also to show how these intrinsic and extrinsic structures conspire and conflict to produce this 'meaning'.

First of all, consider the superimposition of the pendular, metallic squeaking and the sounds of children's' voices mentioned a number of times above. **CD example 17** comprises this section once again. Although it is stated above that the sounds of a *swing* and children *playing* are to be heard here, specific events, why is it that such an interpretation seems so reasonable? Although the structure of the sounds can be taken as specifying these events rather clearly, and their superimposition seems to strengthen their 'association' through a virtual space which although odd in terms of perspective, seems lawful enough, it is helpful to disentangle a number of factors here. Eco (1979, e.g. p. 190-192) suggests a concept that is useful in doing this: that of "motivation". One can regard the structure of real and virtual environments not only as specifying events, but as shown above, as information that provides a context within which events are perceived. The real and virtual environments provide structures which "motivate" certain interpretations of events. Hence, as well as distinguishing between intrinsic and extrinsic relationships, one may also distinguish between intrinsic and extrinsic motivations which provide a context within which such relationships are perceived. In this case, the intrinsic relationship between the two acoustic structures is *motivated* by both intrinsic and extrinsic information, just as their extrinsic relationships respond to both forms of motivation. First, the sounds' intrinsic relationship depends upon a pre-existing extrinsic relationship between swings and children's play. Second, it relies upon the lawfulness of the real environment in which sounds that occur at the same time are more

likely to be related than not, especially where visual information is unavailable, another extrinsic motivation. However, one can reverse this interpretation: the superimposition of the sounds within the virtual environment could be considered an intrinsic motivation which encourages a search for extrinsic relationships between the sounds and causal events, and between these events. It is unclear whether the virtual environment provides impoverished information for events which demands interpretation in terms of the real environment, or whether the real environment provides information which leads to the perception of a relationship within a virtual environment.

This circularity is not a problem, however: it is not important which sources of information are primarily responsible for the perception of a relationship. Rather, it is the interplay between intrinsic and extrinsic structures *per se*, and between the intrinsic and extrinsic structures which form a context within which such structures come to be perceived, that should be noted. One cannot distinguish easily between the intrinsic and extrinsic aspects of the piece except within a particular context. A listener may not at first perceive the precise sources of an acousmatic sound, but may then on repeated hearings find some extrinsic information that provides an interpretation according to a familiar environment. Conversely, a listener may at first clearly perceive sounds as having clear and unambiguous sources, and then on repeated listenings become aware that these sources provide information which connects elements within the piece. In many examples either due to extremely under-specific acoustic structures, or the predominance of event-specific sounds which may be interpreted as a mere 'actuality' recording this interplay may not occur. In these cases, the virtual environment of the piece, or the real environment which it may specify, becomes dominant. This continuum, similar to that proposed by Ten Hoopen (1994; see this thesis Chapter 1, p. 59), is at work dynamically within a piece, and between a listener's different experiences of that piece. Extrinsic

information may be gathered that re-interprets the piece, just as familiarity with the intrinsic structures of the piece may lead to new information being gathered. More than this, however, this dynamic process changes not only the piece itself, but the relationship between the real environment and the virtual environment of the piece.

In order to illustrate this process further, a more global process will be described, which shows the dynamic nature of a single event, and the effects of its changing interpretation over the course of the piece. **CD example 18** recalls an acoustic structure discussed above: the 'falling' sound was shown to have a dynamic relationship with the context within which it occurred, becoming not just a falling sound, but a simulation of a firework sound. Focusing in more detail upon its first occurrence, it is clear that this sound has significance in terms of its gesture: a falling 'object' culminating in the onset of a new event and section **(CD example 19)**: the event which succeeds it is 'prepared' by this 'gesture' and begins a rather different virtual environment.

In order to form this interpretation extrinsic factors must be taken into account, whether of this explicitly event-based kind, or of more conventional 'gestural' terms. In fact it matters little which of these explanations is offered. If one interprets the sound as a gesture *implying* some form of closure, this implication must come from somewhere[3], and whether one chooses the conventions of musical gestures, or the 'conventions' of non-musical objects an extrinsic factor must be admitted. Hence, an intrinsic connection could be said to obtain between this sound and any sound that followed it. In this sense,

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[3] Even if one suggests that some form of gestalt principle is in evidence here, the pitch contour forming a distinct auditory stream made up of a number of acoustic 'grains', it would still be unclear why closure would be implied so strongly except in reference to the everyday or musical environments. According to pure gestalt principles (good continuation) one would expect the sound to continue 'falling' continuously, whereas a musical or event-based explanation explains why such falls are not expected to be infinite. Moreover, as Bregman (1991) suggests, regardless of the mechanism involved in auditory scene analysis and its relevance here, some form of evolutionary match between environment and auditory system, not that different from an ecological notion of coevolution, seems in evidence in the study of auditory streaming and related phenomena.

one could begin to speak of a structural function: according to this interpretation the sound serves to connect two sections of the piece.

This gesture's later occurrence **(CD example 20)** follows a similar intrinsic function, linking two different virtual environments, one similar to a firework display, the other, initiated by a thunder-crack and rain, providing information pertaining to what can only be termed an outdoor 'country' scene. However, as noted above, the gesture appears within quite a different context. This context provides additional information, reinterpreting its extrinsic relationships in terms of its similarity to the sound of a firework. However, its culmination in a thunder-crack suggests a rather more interesting and complex change in significance. The virtual environment provides an *intrinsic* motivation for the connection between this 'gesture' and the following sound, since we have already heard the gesture fulfilling a particular bridging function. Moreover, the *extrinsic* motivations implying closure are still relevant. Overlaid upon these motivations is additional information suggesting that the gesture might be interpreted as analogous to the preceding fireworks. Hence, not only is an impact or closure implied, but also the explosion that follows the fall of a firework. Hence, a *transition* between firework, gesture and thunder crack is suggested which is not only supported by the immediate context in which the events occur, and the extrinsic and intrinsic motivations thus available, but also the motivations provided by the initial appearance of the gesture in a quite different context. Additionally, one might suggest that the original linking function provided by the gesture is itself retrospectively strengthened by its later occurrence in its new and more specific context — although one might need to listen to the piece a number of times to reach this retrospective interpretation. It is possible to interpret this gesture itself as motivating a larger structural interpretation of the virtual environment of the whole piece: a sound that seems artefactual first provides links between the sounds of humans (chanting and reporting news), is a common factor between

these environments and that of a firework display and a 'country scene', and serves to link the latter two environments by providing the listener with information regarding the similarity of fireworks and thunder.

3.1.5 Impoverished information, interpretation and affordances

Before entering into a discussion of how listening to an acousmatic piece can be described in terms of affordances, it is necessary to focus in more detail upon the relationship between impoverished information and interpretation. In the previous chapter it was suggested that interpretation can be thought of as a response to insufficiently specific stimulus information, and that interpretation was an active search for natural, social or cultural information that makes sense of such impoverished information. In a certain sense, the acousmatic piece is an excellent example of such impoverished information, although not in the strong sense implied through Schaeffer's theory of the acousmatic (Schaeffer, 1966). The information available from an acousmatic piece, as has become clear in the previous discussion of *Mi Bémol*, is perceived within the context of the real and persisting environment, and is quite rich in its specification of extrinsic structures. More importantly, however, the acousmatic piece, however impoverished and unlawful it may be in relation to the real environment, is not necessarily impoverished in relation to its intrinsic structure, its virtual environment. Indeed, it is hard to talk of information being impoverished in a piece as rich in acoustic information as this. Hence, it would be misleading to suggest that an acousmatic piece lacks clear affordance structures. Clearly, the structures it presents are impoverished in relation to specifying real environmental events in such a way as to afford immediate actions: the acoustic information, as will have become clear, does not afford in this way.

There are two ways in which one can think of an acousmatic piece providing affordances. The first is that through its impoverishment and

unlawfulness relative to the real environment it affords *interpretation itself*, a search for events and relationships between events which do provide for more immediate action on the part of the listener. However, this is supplemented by the second way in which the piece affords. The piece provides information which is perceived in relation to the real environment and the interpretative action of the listener: in this way the 'meaning' of the piece is not just to be found in its contrast to the real environment, but also in its similarities. The real and virtual environments involved in the perception of *Mi Bémol* interact in such a way not only to provide information for interpreting the piece, but also information which interprets the environment. In this way, the piece may itself be regarded as a cultural event which has an affordance structure. It affords multiply, but in a way constrained by its position within the environment. For example, the piece has afforded a discussion of its structure in this thesis, just as it might afford some other form of analytical response. It could afford use as a cultural unit, as an exemplar of a particular style of music; it could afford communication of Amerindian land rights; it might afford contemplation on the part of the listener. Although these affordances are quite specific, it is not their perception itself which is of interest. Rather it is the way in which through listening to the piece the listener interprets not only the piece itself, but also, by virtue of this, the environment itself. In Chapter 2, the notion of affordances, and more specifically the structures which bring them into existence, was re-interpreted through Peirce's tripartite conception of the sign-function. Here it is helpful to view the way in which this piece might afford in combination with the listener and the environment. **Figure 3.1** shows the tripartite relationship between piece, listener and environment: within this model the piece may be considered as structured information available from the environment.

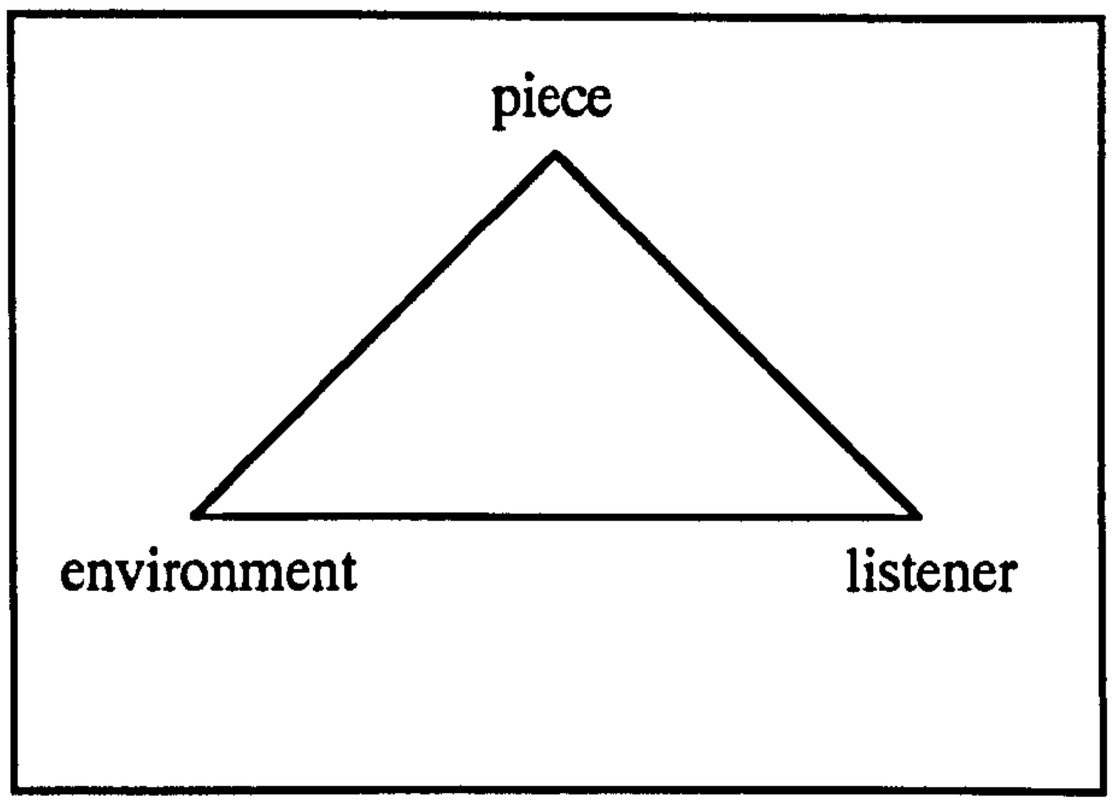

Figure 3.1 A Peircian triad expressing the relationship between listener, piece and environment.

From the perspective of the piece, the environment provides the lawful background against which the listener's perceptions and actions take place. From the perspective of the environment, the piece provides structures against which the environment is perceived and acted upon. It is not so much that the listener interprets the piece, rather that the piece, the listener and the environment may all be regarded as interpretants of the two other components of the triad. Hence one interprets the piece in terms of the listener, in terms of the environment, or in terms of the piece itself, but always taking into consideration the relationship between all three components. The affordances of this situation, the coming together of piece, environment and listener, will depend upon the structure of the piece, the structure of the environment and the structure of the organism. In the analyses presented above, the listener was treated in a rather cavalier fashion, through presenting the kinds of explorations of real and virtual environment a single listener might make. Clearly though, the affordance resulting will be changed if any of these components is altered: differences in the environment (including social and cultural contingencies), in the piece, or in the listener's interpretative actions will all create the possibility of a different affordance being perceived. Moreover, as noted above, it is difficult to clarify which of these mutually

interacting sources of structure is responsible for a particular interpretative decision. The important point to note once again is that one can view the perception of an acousmatic work as affording in two different ways: first, the mismatch between environment and piece relative to the listener may afford a search for information regardless of any observable change in the listener's behaviour; second, the information gathered during this search may itself lead to the perception of new affordances. Covert interpretative action is no less real than the overt actions of booing and hissing or applause which greet new works in the concert hall. Indeed, such covert actions may lead to lasting changes in a listener's behaviour which are difficult to trace in causal terms back to the experience of a piece. Indeed, in forming new interpretations (new cultural codes which might be shared and developed by a social body) the mutual relationship between the real and virtual environments involved in acousmatic music is no less pertinent to human ecology than any other change in our surroundings. This *critical* component of acousmatic music will be revisited towards the end of this chapter, and will form the basis for the final chapter of this thesis.

3.2 Further analyses

3.2.0 Generalising to other pieces

The analysis of *Mi Bémol* illustrates the ecologically contingent nature of a particular acousmatic piece. To show that such contingency is at work across the spectrum of acousmatic music would require that a large corpus of pieces be analysed within a similar framework. However, what has been demonstrated is that the ecological approach taken does seem to dissolve the supposed barrier between musical and everyday perception, or at least suggest that for acousmatic music, the intrinsic structure of a work both reflects upon

and is motivated by its surroundings. In general terms, this suggests that taking into account the way that acoustic structures specify events, rather than assuming that acousmatic music is interpretable as being purely intrinsically structured, may be an approach which helps to clarify the *object* of analysis so problematic for acousmatic music within the context of an essentially score-based musical culture. Hence, rather than attempting to *prove* that the analytical approach taken is valid for all acousmatic pieces, this chapter will continue by applying itself to a small number of further case studies. As noted above, the intention in analysing a single piece in some depth was not to exhaust its potential interpretations but to illustrate how such interpretations may come into being through the relationship between real and virtual environments. Similarly, the shorter analyses presented below do not attempt to show that the analytical method is *valid* in any generalised sense: rather, they serve to show how particular virtual environments can interact with the real environment to produce other kinds of 'meaning'.

3.2.1 Pierre Henry: *Variations pour une porte et un soupir- Comptine*

Comptine, the eighth 'movement' of Henry's *Variations* **(music example 3.1)** illustrates the tension between intrinsic and extrinsic structures in acousmatic music in an extreme, yet subtle fashion. Disregarding the titles of the piece and this specific movement for the moment, and focusing upon what may be heard, it is notable that the acoustic structures of this piece have multiple environmental specificities. These specificities serve to articulate the virtual environment in a number of ways. First, despite the differences between the individual sounds it is apparent that a single type of source is responsible for the acoustic structures, some form of 'squeaking'. However, in contrast, this 'squeaking' is differentiated according to a number of possible events. Some of these seem to specify a familiar instrumental source, a single reed instrument, perhaps a saxophone, some a more 'accidental' event such as

friction between two surfaces. The sounds, whatever their precise sources all suggest the gestural intervention of a 'player' in the broadest sense. One could suggest that a continuum between a familiar musical source, and a familiar everyday source is present here, but notwithstanding this continuum some form of manipulation of the events concerned seems likely. Two motivating factors can be suggested here. First, the 'instrumental' nature of some of the sounds serves to motivate an interpretation based upon a musical environment. Second, within this interpretation, the improvisatory quality of this 'performance', whilst challenging any traditional models of musical structure, is clearly not an actuality recording of a 'natural' event. On the other hand, if we are hearing an instrumental performance, it is clear that whatever familiar instrument might be perceived, many of the sounds provide information which challenges this perception.

Contextual information helps provide a less ambiguous interpretation here. The title of the piece, and any sleeve notes available might tell us that these sounds are in fact all derived from a single recording of a door. Regarded in a traditionally acousmatic sense (e.g. within Schaeffer's theories, 1966) the transformations that have occurred between the resultant sounds and the original recording distance the piece from the original events. Although it is not suggested that such a result was intended, it is clear that the virtual environment is not independent from the real environment which was recorded, nor from the real environment with which the listener is familiar. Whether or not the listener 'hears' an instrumental source, a door-squeak or fails to hear any source for the sounds at all, perception occurs within such contexts. Indeed, it is suggested that it is the interplay between the virtual environment and the real environment which provides this piece with its focus. The acousmatic does not serve to conceal sources here, but serves simultaneously to challenge and conform to the lawfulness of the real environment. The sounds are not a squeaking door, nor are they a saxophone,

but they preserve certain invariant features of these sounds in such a way as to present a perceptual conflict. Herein, it is argued, lies the aesthetic component within this piece, a tension between the real and the virtual.

Before moving on, it is important to note that there is a further and more subtle level of specificity here. The 'quality' of the sounds employed, their texture, should not be regarded as a purely abstract, auditory phenomenon. This textural aspect is closely related to the possible causes of such sounds, and hence plays a role not only in specifying particular events but providing a link between the piece and the environment of real events. The structure of the sounds specifies causation in a direct yet general fashion: we hear some form of contact between two surfaces, or the supposed vibration of a reed between the lips of a player. Moreover, the possibility of hearing a player provides the basis for perceiving a human body as direct instigator of the events. The quality of the sounds is far from abstract, however abstracted from specific events our perceptions may become. Even familiarity with the 'real' sources of the sounds in this piece, or conversely an attempt to banish such considerations, cannot wholly disturb this virtual environment. Indeed attempting to follow such listening strategies tends to increase the tension between the 'real' and virtual environment: on the one hand it does not sound as if all the sounds are best interpreted as *merely* a door squeak, on the other they do not seem to be an abstract set of structures. A virtual environment is suggested which is at once a performance, a recording and an exploration of acoustic quality. The latter aspect, however, should not be divorced from the events which produce sounds. A play of timbres may be a good description of this piece in one sense, but only when this description is related to source specificity does it take on its full interpretative significance. In order to hear this piece in an abstracted form, one must disregard all the information which richly specifies causal events, an interpretative course which implies a *negation* of this specificity. Such a course is in no way invalid as an

interpretation, but must be seen within the context within which it takes place. Whether or not the environmental contexts suggested here are perceived, it is clear that these sounds may inform the listener about more than just themselves, and it would be misleading to suggest otherwise.

3.2.2 Fred Frith: *Guitar Solos*- Alienated Industrial Seagulls

Although this particular piece (**music example 3.2**) cannot be regarded as truly acousmatic, in that it is a recording of an instrumental performance, its recorded form presents a number of issues relevant to the discussion of the contingent nature of the acousmatic work. The electric guitar, despite its versatility, has a familiarity in the latter part of the twentieth century which is undeniable. Although electronic transformation is very much a part of its identity, and playing styles differ considerably, it is generally an easily identifiable instrument. Here however, the 'history' of the electric guitar is challenged through the acoustic structures available from the virtual environment. What we hear is hardly recognisable as a guitar at all: we hear rattles, scrapes, bangs, and very few sounds which clearly specify either the playing styles with which we are familiar (blues, jazz, rock) or the instrument itself. The most important source of information identifying this as guitar playing at all is the information provided through familiarity with Fred Frith as a particular player, and connected to this, the information available through the cover of the CD, which conveniently provides a photograph of Frith with a subtly modified guitar in conjunction with the overall title 'guitar solos'.

In the case of this piece the relationship between real and virtual *events* is a subtle one. The virtual environment is one which provides information for a number of events which seem to have little to do with guitar playing. Indeed, it is clear that if one wishes to interpret this piece as a 'guitar solo', rather unusual playing techniques must be involved. Without the extrinsic context of 'guitar solo' the piece could be an actuality recording of any number of

sources, and any interpretation arrived at would likely leave out the real component of the guitar as a factor. Is the guitar and its player then a virtual or a real source for the acoustic structures which result? In one sense the guitar is a real source, despite its interaction with unusual materials and some degree of electronic manipulation, in another it is a virtual source, specified only through familiarity with the cultural environment, especially the linguistic specificity provided by the sleeve of the CD and any contact a listener may have had with Frith's playing. Not taking this duality into account leads to a situation in which this piece remains *either* a guitar solo, *or* (perhaps) an improvisation using everyday objects. It is not suggested that either of these interpretations is of less value than the other, but it is proposed that the conflict between them leads to an added layer of significance. Only by considering the differing sources of information available to the listener does it become clear that both interpretations may be motivated simultaneously through dual extrinsic contexts (guitars or the everyday sounds of colliding, scraping and rattling 'objects') thus providing an interpretative tension between our familiarity with guitars and the information for events provided by the sound of the piece. Moreover, it is proposed that interpretative action is itself *afforded* by the conflicting structures available to the listener. Conflict between sources of information, just like insufficient information, *affords* interpretation, whether through a perceptual search for additional information (which may never be definitive), or through the production of interpretative statements which purport to explain the piece. To give one such 'interpretative statement', this piece seems to provide information which both challenges perceptions of what a guitar itself might afford and what might be afforded by a virtuoso instrumental technique. The important point to note here is that such a statement only makes sense in relation not only to what is heard, but what is available from the context in which it is heard.

One should also note that any clear distinction between culture and nature here is facile: Frith's playing is 'naturally' lawful in that it is the result of actions which conform to the possibilities provided by the relationship between his body, an instrument and the information provided by his perceptual systems, but equally the results of these actions are *cultural* in that they challenge the more contingent laws which a listener relies upon in making sense of these actions. That these cultural constraints are just as dependant upon the perception of other players' relationships with their resources and are hence far from arbitrary emphasises not the differences between cultural and natural environmental structures but their common source: the activity of human beings in relation to their environment. Viewed from another perspective, one might equally state that Frith's own playing results from his own actions within the context provided by his 'cultural' knowledge of guitar playing: likewise, this cultural knowledge is derived from familiarity with the environment, and is far from arbitrary. Neither natural nor cultural lawfulness can be examined independently from the organism which perceives and acts.

3.2.4 György Ligeti: *Artikulation*

In Chapter 1, an aural score of *Artikulation* (Ligeti/Wehinger, 1970) was criticised for its conflation of functional and perceptual analyses (see Delalande, 1986). Indeed it was proposed that this score reifies certain functional aspects of the composition and presents these as a perceptual analysis in a potentially misleading fashion. Within the framework developed in this and the previous chapter it is possible to suggest some alternative analytical interpretations of this piece. Rather than fixing the meaning of the acoustic structure within the context of its manufacture, its actual sources (oscillators, filter banks, etc.), the analysis proposed here attempts to show how the uncertainty in attribution of source events is itself a component in

possible interpretations. Within such a view, the actual causes of the sounds are at issue, but only insofar as they are available to listeners through structured information, and in relation to the listener's environmental context.

It is suggested that in perceptual terms, this piece creates a tension between virtual and real sources, between its status as a piece of "electronische Musik" and as information for possible events. It does provide information for 'electronic' events with which many listeners will be familiar. In combination with a familiarity with the history of electronic music, it would also be possible to suggest an interpretation based upon this work's position within such a history. One might for example 'hear' this piece in relation to Stockhausen's early electronic studies or *Kontakte*. The environmental context in this case is a highly specific one, and its specificity is relative to two sources of structured information. The first is that of the piece and its particular acoustic structures and listening context, the second, familiarity with the acoustic structures of a number of other pieces in combination with their listening contexts, contexts which include information regarding their manufacture.

This piece, however, cannot be seen merely as the result of the technical and historical processes perceived. Just as one might hear 'electronic' source events, and indeed, in combination with the information provided by the 'score', the 'imitation' of speech sounds, one also hears 'metallic' sounds, sounds that specify flowing and bubbling fluids, wind, and changes in spatial structure which suggest events occurring within a number of virtual spaces. These latter interpretations are no less valid than those made in relation to the real sources identified through perceiving the piece in relation to studying the score or listening to other instances of electronic music. Indeed, one might argue that a distinction between real and virtual sources is only possible with reference to the particular real environment of the electronic studio. For the listener, no such context should be assumed to be

relevant to interpretation, nor should it be proposed as providing some form of necessary ground against which other interpretations are to be contrasted. The tension between interpreting this piece as 'electronic music' and as a montage of sounds that more closely resembles occurrences outside the electronic studio is not to be dismissed lightly. Whatever prescriptive motivations might be given for attempting to ignore the alternative environments which may have produced the sounds of this piece, it is clear that a perceptual approach must embrace all such possible contexts and resulting interpretations: just because the sources of the sounds are well documented does not mean that we are constrained to interpret the piece according to such documentation. Indeed, for most listeners, despite their familiarity with the environment of electronic sound sources, an environment impossible to ignore in contemporary western life, the precise provenance of the sounds will remain contingent unless emphasised through a programme note or the score. For listeners, and for analysts whose interests lie beyond the actual manufacture of the piece, an everyday interpretation of the events involved in the piece is no more or less 'true' or 'objective' than one which accounts for sounds in relation to their actual production and status within the historical context of electronic music.

Take, for example, the opening of the piece (**music example 3.3**): is it not possible to interpret the events one hears as drips of water and the impacts of various solid objects? Moreover, as the extract develops one might perceive a growing conflict between such an interpretation and the more clearly artefactual sounds which occur. This contrast between two possible environments creates the possibility not just of interpreting the piece as referring intrinsically within an abstract timbral or gestural framework, and extrinsically in relation to the 'environment' of electronic music, but also as an interplay between the electronic, or synthetic and the 'natural'. Moreover, within the 'natural' domain one could suggest an interplay between solid and liquid events, a kind of proto-narrative interpretation wholly independent of

the axis between real and virtual source environments. Such interpretative axes are as important for electronic music as they are for acousmatic pieces which more unambiguously combine recorded and synthesised sounds. Indeed, as argued in the previous chapter, the perception of any acousmatic piece always occurs within the broader context of the familiar environment in which sounds are perceived as information for familiar events, as a contrast to everyday perception, yet intimately related to it. Through the mismatch between everyday perception and acousmatic perception, informed by the inability of the listener to explore the perceived events in an unconstrained and cross-modal fashion, the listener is placed in a position where either perception is both impoverished or misleading in relation to the immediate listening environment, yet meaningful in a less immediate, but no less informative fashion.

As noted above, although the virtual nature of an acousmatic environment may constrain the listener from intervening directly in the events that might be perceived, this does not mean that such events cease to be meaningful in an ecological sense. Although the affordances of such events are undoubtedly transformed by their unusual context or by processes of electronic production or transformation, or indeed by a tension between their status as information as such and information for events, such processes lead to new affordances. The electronic sounds can be heard as impoverished information for everyday events, and the tension between everyday and electronic contexts literally affords a search for some kind of social or cultural explanation. That this search may be open-ended in terms of its direct consequences for the future actions of the listener does not reduce the importance of viewing an aesthetic response within the broader context of human actions. By *actively* attempting to produce discourse which 'makes sense' of what we hear as a cultural object, as 'communication', as 'art', the listener acts in such a way as to replace an everyday interpretation (which is

clearly contradicted not only by the structure of the piece but by the structure of the environment in which it is perceived) with one which is consistent with a view of the environment as a *human* environment. Moreover, viewing this piece in such a way, as a structure which affords interpretation in relation to the human environment, avoids reducing musical experience to the discovery of any sole structuring principle by portraying interpretation as an active process which momentarily fixes the piece within the context of human behaviour and the human environment. Such a momentary and contingent view is in direct contrast to that of attempting to define a neutral level of analysis for acousmatic music (Nattiez, 1990) whether through the observation of documentary evidence which supports particular views of analytical pertinence or through empirical research which takes as its starting point the abstract and self-referential nature of musical structure (see Chapter 1). On the contrary, meaning is seen as arising from the mutual relationship between listener and piece.

This need not lead to an extreme relativism in which all interpretations have equal status: in the case of Ligeti's *Artikulation* it is clear that by describing available information, an interpretation of the piece may be shown to be grounded within particular informational contexts. The analyst's role within such an approach is to identify such contexts and how they constrain and inform interpretation at any given time, not to discover any more general and coherent view of the 'work'. Such a perspective may not result in the kinds of structural insights desired by traditional models of analysis[4], but serves instead to emphasise the shortcomings of viewing acousmatic music as a coherent analytical object. Whereas Wehinger's 'listening score' (Ligeti/Wehinger, 1970) attempts to explain how the piece is constructed, and

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[4] One might suggest the *Ursatz* of Schenkerian approaches or the *Grundgestalt* of Schoenbergian approaches as examples of the kinds of interpretative fixity the present approach attempts to avoid. Although these concepts of harmonic/contrapuntal or motivic unity come from tonal theory, they can be seen as analogous to the attempts made by contemporary theorists to emphasise the intrinsic unity of acousmatic works at the expense of their extrinsic contingency (see Chapter 1).

to direct our aural attention to acoustic features which relate to such an explanation (or confirm it), the approach developed here offers no such certainty. However, it is hoped that what is achieved is a view of the relationship between pieces, the human environment and human perception. In this vein, *Artikulation* is not seen as an analytical object, but as structured information which, combined with other sources of information, may result in interpretation. The 'work' is seen not as an object but as a *relationship* between listener and the environment, a relationship which is dynamic, yet open to analysis. Similarly, any division of the work into smaller units must always take into account these units' contingency. *Artikulation* is not its score, nor is it just an acoustic trace, nor indeed is it merely something which resembles everyday events yet fails to specify them unambiguously. It is a combination of sources of information and can be analysed in such terms. These sources of information may include Wehinger's aural score (Ligeti/Wehinger, 1970) but may also include sources of information available only to a particular listener. Some sources of information, such as the real environment, must be regarded as having more stability and generality than others, but none should be discounted as having relevance to an analysis. Moreover, interpretation itself should be seen within its social and cultural context, as a means of actively constructing affordances where these are ill-defined through perception of the immediate structure of the environment. In the case of *Artikulation* it is clear that there is a distinction to be drawn between awareness that acoustic information is available, and an attempt to understand this acoustic information in relation to the human environment as a whole.

3.3 Summary and conclusions

3.3.1 Description, interpretation and affordances

Through analysing the relationships between the virtual environment of the piece, the listening environment, the lawfulness of the more extended environment, and the listener, it has been suggested that acousmatic music can and should be analysed in a contextual and perceptual fashion. An ecological approach to analysis has been taken which succeeds in revealing structures concealed from those who attempt to impose traditional concepts of self-referential structure upon acousmatic music. Within such an approach the context provided by the musical environment is but one of many possible contexts within which interpretation may occur.

No attempt has been made to propose any falsifiable theory of listening in this chapter. It is not the aim of this thesis to propose a theory of musical listening, but to show how our view of musical listening is itself inadequate if it continues to assume that the perception of music can be studied independently from perception as a whole. It is suggested here that the contingent nature of our interpretations of acousmatic music may itself serve to generate fresh insights into research in music perception, if only as a reminder that musical behaviour occurs within a much broader context of human behaviour, and that musical works cannot be wholly separated from the much broader context of the human environment. However, the prime function of this thesis is to provide a theoretical standpoint which is appropriate for the descriptive study of acousmatic music, and to demonstrate how such a theory can be applied analytically. Through such a process it becomes clear that rhythm, pitch and timbre need not be the central focus of musical structure and meaning for all music, and that through shifting the emphasis away from such a view of music as pure structure the 'problems' of acousmatic music become largely dependant upon whether one is prepared to

accept such a change in focus. Lack of notation, lack of a theoretical basis for pertinence, lack of theoretical terminology all become far less important when it becomes clear that acousmatic music reflects a dual nature, at once significant through its internal transformations, superimpositions and juxtapositions and through its connections to the external world.

The analyses presented above also reveal the way in which a description of an acousmatic piece might take the form not of an analysis of the piece itself, but of the relationships that can be formed between the different sources of information which can be brought to bear upon the interpretation of a particular listening context. Interpretation has been characterised as an attempt on the part of the listener to make sense of the conflicts between different sources of information and the environments they specify through actively seeking out contextual information and constructing some form of affordance structure, however ill-defined and unstable this might be. Listeners perceive what to do with a 'piece' just as clearly and directly as they perceive what to do with any environmental event. That listening to a piece can be a private contemplative act does not contradict this view: for the piece to be *interpreted* it must result in a change in the relationship between listener and environment. Merely acting to sit down and ignore other events and attend to the piece itself should be regarded as sufficient justification for such a view: the piece, as a contextual whole, affords such actions. Similarly, the attempts we make to bring such 'private' decisions into the social and cultural domain, through analyses of our own aesthetic behaviour must also be regarded as being afforded by the context of the piece. It is not only theorists and analysts which attempt to make sense of what they hear through social and cultural interaction with other humans.

Hence, to reiterate the ways in which acousmatic music 'affords', it is clear that the mutual process of listening within the environment affords certain characteristic interpretative actions. The listener, rather than seeking to

act in an immediate fashion relative to currently available information, acts in such a way as to search for and even produce new information. Through such interpretative action events become defined which are perceived to originate in familiar contexts, whether everyday or musical, natural or cultural. These events are not the sounds of the piece, but should instead be regarded as events for which the sounds provide structured information. These events become linked through their perceived origin within coherent and lawful environments, and the relationships between such environments. Whereas the structured information available to the listener may afford interpretative action, such interpretative action itself produces new affordance structures. The process of interpreting acousmatic music leads to clarification, however contingent and momentary, of the events that might be perceived: these events, whether individually or in combination, afford things for the listener. The listener might, for example, choose to attend to the piece again, perhaps focusing their attention upon rather different aspects of the acoustic structure, as a result of interpretative action. Here, the piece affords a repertoire of actions. At the most banal level the piece affords those actions which lead to replaying the piece. Just as a sentence might afford 'looking' in a particular direction, the piece affords listening. More than this, however, the piece in this case affords a particular attentional focus. Just as the visual structure of an object affords perceptual activity focused upon certain aspects of that object, such as toward the handle of a tool in the case of grasping, the acoustic structure of a piece may also be regarded as information which affords directed attention. This of course is rather different from perceiving the graspability of a handle of a tool itself. However, the events and environments perceived in relation to an acousmatic piece do afford in this way as well. A piece may afford 'discussion', and it may afford being *used* as a cultural unit, a tool within the human environment, which comes to have some coded structure.

To place this in its proper context, it is clear that acousmatic music is distributed, discussed, exchanged, played, diffused and so on. Acousmatic pieces are hence themselves part of human behaviour and not just abstract units which are interpreted in the private domain. The information they make available, in combination with the interpretative actions of the listener, affords socially, as part of the social human environment. Such information provides a focus for interpretative action, but action nonetheless, manifested through our continued involvement in the kinds of behaviour which are afforded by acousmatic music. However, it is clear that for acousmatic pieces to become meaningful in this way listeners must in a sense create such meaning through interpretative action. Listening itself plays only a small part in the affordance structure of an acousmatic piece, as will have become clear through the environmental contingencies analysed in this chapter: it is the *connections* between listening, the environment and our actions which make potential interpretations available. The 'piece' may be a focus for the perception of affordances, but the affordance structure perceived is a complex of informational sources in relation to such a focus.

The analysis of *Mi Bémol* is especially pertinent to this view. Not only does this piece afford interpretation, an attempt momentarily to fix its relationship to a number of possible environmental contexts, but it may also lead the listener into new relationships with the human environment through informing us about cultural matters, even political matters, through its narrative elements. Moreover, to any listener familiar with the musical environment of the west, its juxtapositions of musical and 'extra-musical' structures provide information relating to the structure of the musical environment itself, and the relationship between the musical environment and the everyday usage and perception of sounds. It is difficult to tell whether the kinds of cultural relationships about which we are informed motivate the intrinsic structure of the piece, or whether the particular structures of the piece

lead us to perceive such cultural relationships. In this sense the piece not only informs us about the cultural environment, but also affords certain actions in relation to this environment. For practitioners of music, the perception of a piece such as this may afford changes in their compositional or performance practices, for theorists and analysts the creation of new analytical and theoretical discourses to deal with its particular character, and for all listeners, regardless of their particular perceptual development, *something* will be afforded. That something may be turning off the CD player, deciding to buy and repeatedly listen to the piece, or attempting to explain to others why it is of value. Regardless of the lack of immediate survival value in the perception of, and action in relation to, acousmatic music, this is no reason to suggest that no affordances are available. Clearly we do act in relation to cultural events, and in the case of acousmatic music there is no better example of a cultural event which has the potential to inform us about so many diverse environments, and the relationships between these environments. Acousmatic music does not merely *represent* events, it may specify them, whether through invariants which survive electronic transformation or are produced by electronic transformation. Through such direct means, the affordances of events themselves become open to interpretation on the part of the listener, and manipulation on the part of the composer. Although we do not take cover when we hear the sound of gun-fire in an acousmatic piece, the event that we perceive retains the potential to afford, but in a more flexible and less immediate fashion.

3.3.2 From description to critique

At this point it becomes clear that the analytical approach taken thus far is deficient in an important respect. No attempt has been made thus far to evaluate the possible relationship between acousmatic works and the society and culture in which we find ourselves except in the most descriptive terms.

To suggest that acousmatic music informs us about the environment both directly and through our attempts to interpret it is insufficient if we are to come to any understanding of the value we might ascribe to such information. Acousmatic music is different from the real environment, but perceived in relation to it, and this implies the need not only to describe these differences and relations in disinterested terms, but also in terms which reflect the possibility that we might attain some insight into the everyday environment through the transforming focus of the acousmatic work. Put in the most stark terms, the perception of the so-called 'real' environment may be contrasted with the acousmatic piece in that it seems that perceiving and acting in relation to the real world has direct consequences for our survival, whereas perceiving and acting in relation to an acousmatic piece seems peripheral to matters of survival. Failing to perceive food sources results in starvation, and our actions in relation to food sources can be seen to have consequences not only for the individual but for social groups. The sharing of food sources, in relation to our social organisation, and the cultural codes which relate to such sharing, can all be seen to have direct and valuable consequences for the survival of individual humans. The same can hardly be said for acousmatic music. Here, not only are the events we are informed about unavailable for our immediate consumption or use, they are often only indirectly related to our survival in their specification of environments which are structured unlike the real environment. Although acousmatic music has been considered informative in relation to the real environment, a description of the structured information which makes such relationships possible cannot explain why perceiving an acousmatic work might be of *value* to individuals or society.

One could respond to such a stark distinction between aspects of the environment which are immediately concerned with survival and those that are peripheral to such needs by regarding the perception of acousmatic music as a purely aesthetic act. Indeed, such a view would be in agreement with a

view of art as being defined by our disinterested attitude towards it (e.g. Kant, 1952). However, having shown that acousmatic music itself has the potential to blur the boundaries between the musical and the everyday, between intrinsic and extrinsic and between cultural and natural, it seems rather unlikely that distance from the concerns of the everyday is a sufficient description of acousmatic music's relevance to human experience. On the contrary, the distancing effects of the acousmatic medium have been shown to be matched by the ways in which sounds retain structural pointers beyond the piece itself, and that the tension between the context of the piece and the context of the wider environment has been shown to have an illuminating role to play in analyses of particular pieces. It is precisely because acousmatic music so unashamedly juxtaposes the real and the virtual that it seems so unusual in aesthetic terms, and to suggest that acousmatic music allows us to dispassionately assess such a juxtaposition runs against the grain of the ecological approach to perception adopted here. If one attempts to talk of the affordances of acousmatic listening, the potential it has for constraining and suggesting action, however indirect, however interpretative, then it is clearly incorrect to propose that acousmatic music elicits a disinterested response.

One way of moving away from viewing acousmatic music as a source of information, and developing insight into the value this information might have for us, is to consider the wider implications of analysing acousmatic music in an ecological fashion. It was suggested in the opening chapter of this thesis that acousmatic music is notable for the attention it pays to mimesis, to the representation of reality. However, the mimetic aspect of acousmatic music has been shown to operate at the same time, and in concert with, the virtual nature of the acousmatic listening experience. We hear events which may simultaneously specify intrinsically and extrinsically. In the last chapter of this thesis, an attempt will be made to show how an evaluative approach to aesthetics might be formed which takes into account the kinds of descriptions

advanced here. Moreover, an attempt will be made to show how both listener and composer perceive and act upon the environment within the context of acousmatic composition. Although an attempt has been made thus far to concentrate upon description based upon the kinds of perceptual and interpretative behaviour relevant to the listener, the production of pieces themselves will be shown to occupy a middle-ground between representations and transformations of reality and its affordances similar to that perceived by the listener.

Chapter 4

Acousmatic music, aesthetics and society

4.0 Introduction

The two previous chapters can be seen as providing an alternative discourse for describing acousmatic music, a discourse which places emphasis not upon traditional music theory, but upon the structures which acousmatic music makes available to the listener, the environmental events and contexts these specify, and the interpretative actions these afford. This chapter aims to reinterpret this ecologically contingent view of acousmatic works in terms of aesthetic, rather than music-analytical theory. If the previous chapters propose an alternative view of how acousmatic music can be considered an analytical 'object', then this chapter should be regarded as an attempt to draw some conclusions as to what kind of aesthetic 'object' this alternative view suggests. Furthermore, having proposed an aesthetic interpretation appropriate to the analytical concerns identified thus far, this interpretation will be assessed in relation to a number of wider issues relevant to the study of contemporary musical culture. Lastly, some more general conclusions will be presented, which will present an assessment of the implications of this research for the theory and practice of acousmatic music and the relationship between perceptual and musical issues. Hence, this chapter as a whole represents both a conclusion, and a reinterpretation within an explicitly critical approach to the aesthetic and social issues raised by acousmatic music.

4.1 Acousmatic music as critique

4.1.0 Introduction

The ecological approach to perception provides a framework within which the analytical focus is shifted away from sound itself towards sound as information for events, thus providing a context within which an appropriate description of an acousmatic work may be seen to derive from our familiarity with the environment. Within such an approach, musical structures may play a role, but this role is not a dominant one. Indeed, quite the converse often seems to be the case: familiarity with everyday events often provides sufficient context within which to form an interpretation. This being the case, any aesthetic evaluation of acousmatic music must account for this apparent shift in emphasis away from the explicitly 'musical' towards the 'everyday'.

Hence, this section will consider an approach to aesthetics that already contains within it a recognition that art both draws upon pre-existing structures and yet distances itself from them. It has become clear that acousmatic music may be interpreted through such a dual process: the impoverished and transformed information offered by an acousmatic work both specifies aspects of the real environment, yet also contradicts aspects of it, thus specifying a virtual environment. The 'acousmatic' does not always serve to conceal events (cf. Schaeffer, 1966), rather it serves to dislocate the listener from their everyday *affordances*. The challenge for an aesthetic interpretation of such music is that whereas we are encouraged to regard traditional musical forms of Western art-music as being primarily self-referential (see Chapter 1) and hence *autonomous*, acousmatic music seems more to resemble representational art-forms such as pictorial art, photography and film in its reliance upon the extrinsic. However, the challenge is more than this: the context provided by the everyday environment suggests that even where the materials of a work are not derived from the listener's

surroundings directly, event perception may provide a meaningful and extrinsic basis for listener's interpretations of acoustic structure. To suggest an analogy with visual art, despite the supposedly abstract and non-representational nature of certain forms of painting, it is possible to 'see' familiar forms and figures. Rather than seeing this as the *projection* of familiar visual forms onto the canvas it is suggested that such perceptions are accounted for by the pick-up of impoverished invariant structures which nonetheless contain sufficient structure to specify virtual objects. In the same way, acousmatic music may be interpreted within the context of event perception, structure being searched for and developed through familiarity with the sounding environment, rather than imposed.

Thus, the following discussion will investigate the aesthetic implications of a reconsideration of what acousmatic music *is*. The previous two chapters redefine acousmatic music in relation to a realist view of perception, providing analytical descriptions which avoid the implicit or explicit reification of intrinsic structure. Although, as will be shown below, all musical works can be considered to mediate between external reality and their immanent structure, acousmatic works present this mediation in an extreme form. The extremity of this mediation between reality and the work itself will be shown to have more than just a neutral value. Acousmatic music, it will be argued, has a critical potential in relation to the world, not just an informative one.

4.1.1 Aesthetic autonomy, listening and composition

In section 1.3 of Chapter 1, attention was drawn to the need to address the conflict between the notion that music is primarily self-referential and the clearly mimetic aspects of acousmatic music. Similarly, the 'metaphorical' approach to musical meaning, exemplified by Hanslick (1974), Langer (1953; 1957) and Scruton (1983) was criticised and compared to both recent

developments in musicology (e.g. Agawu, 1991; Lidov, 1987) and the concerns of acousmatic practitioners, both of which present challenges to the ideology which underpins such approaches.

However, the *relationship* between extrinsic reference and intrinsic structure was only touched upon. Here, the importance of understanding this relationship will be argued, concentrating upon both the *practice* of acousmatic music, expressed through the writings of composers, and the analytical *object* identified through the previous two chapters. Although, as noted in Chapter 1, the discourse of composers must always provide a functionally biased view of acousmatic music, many of the concerns expressed through this discourse will be shown to correlate with the listener-oriented approach to description developed above. This should not be taken as evidence that such *functional* analytical discourse has been in some way validated through a *perceptual* discourse (cf. Delalande, 1986). Rather, these two bodies of evidence should be taken to indicate quite separately how such a relationship reflects both compositional and interpretative concerns.

In what way then, does the discourse of certain composers suggest a relationship between intrinsic and extrinsic concerns within their music and how is this relationship described? Wishart (1985; 1986) and Smalley (1986; 1992; 1994) both regard the prevailing view of timbre as musical parameter with disdain (see esp. Wishart, 1985; Smalley, 1994), regarding it as having a clear relationship with sound sources. For Wishart, extrinsic reference is fully "compatible" with more intrinsically motivated structuring processes, indeed the two may be bound together inextricably:

> "I decided to attempt to set up a sonic architecture based on the relationship between the sound-images themselves which would remain compatible with my feelings about musical structure"
>
> (Wishart, 1986, p. 55)

Smalley, similarly regards both *abstract* and *concrete* aspects of sound as compositionally important, as shown in his discussion of these terms in relation to the use of a 'car' sound in an electroacoustic piece:

> "One can imagine a context where the spectral design of the car's sound could be associated with other sounds of related shape. In this way the composer could manipulate the context so that the listener is drawn into following abstract aspects of the sound's design rather than thinking about the significance of cars as objects. On the other hand a musical context could be created where the car's sound is used to make a statement about cars as cultural symbols. Ultimately, in explaining the role of the car's sound in its musical context, we should want to explore both aspects of its meaning...All sounds possess this dual potential—the *abstract* and *concrete* aspects of sound—and all musical structures are balanced somewhere between the two..."
>
> (Smalley, 1986, p. 64)

Moreover, although Smalley concentrates in this and other writings upon the abstract pole of this axis (see also Smalley, 1992; 1994), his view of such matters also implies a duality between perceived causation ("surrogacy") and more traditional acoustic descriptions and their shared role in articulating intrinsic musical structures. Moreover, he also suggests that:

> "any extra-musical message conveyed in a strongly mimetic work is carried and articulated by spectro-morphology..."
>
> (Smalley, 1986, p. 92)

The abstract structure of sounds is seen as being a carrier of extrinsic structure:

> "The power of a concrete sound-image to portray things, events or psychological circumstances, rests not just on the immediacy of the images themselves but on how the sounds are constructed and combined—their spectro-morphology—and that involves using reduced listening to investigate the more abstract dimension."
>
> (Smalley, 1986, p. 64)

For both Wishart and Smalley, sounds are seen as functioning both in intrinsic and extrinsic fashions. Moreover, both stress the *compatibility* of the two

functions, and the ways in which composers might relate one to another. Although Smalley still insists on using the term "extra-musical" (Smalley, 1986, p. 92) and, in his concentration upon the abstract at the expense of the concrete, tends to suggest a more traditional divide between music and everyday concerns than Wishart (see e.g. Wishart, 1986), it is clear that such a distinction is becoming hard to maintain. Smalley notes that:

> "The range of sound sources available as materials for electroacoustic music, and the scope of spectro-morphology's influence demonstrate an unprecedented broadening of our conception of the nature of music, demanding of the composer a much deeper and broader understanding of the role of sound in human life..."
>
> (Smalley, 1986, p. 92)

In the face of such an inclusive idea of music, retaining the notion of musical autonomy becomes a matter of some difficulty if one assumes that this autonomy refers to the separation of music from the everyday world. However, attempts are still made to maintain a division between the 'logic' of the work and the 'logic' of our surroundings, if not between the musical and the extra-musical: Smalley's notion of abstract and concrete[1] aspects of sound is one version of this division.

A rather more sophisticated analysis of such matters is provided by Emmerson (1986): rather than a simple opposition between abstract and concrete, the material and 'language' of electroacoustic music are here both shown to be articulated by a varying attention to structuring processes drawn from the material itself, or imposed upon this material. Since, in compositional terms, the material of electroacoustic music may be considered either 'manufactured' or 'found', and the techniques applied to this material may either be derived from some aspect of this material or independent of it, Emmerson suggests the following oppositional axes: one of syntax, between

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[1] This opposition, as Smalley notes, is derived from the work of Schaeffer (1966). However, Smalley's theoretical work, although stressing the importance of reduced listening, presents a far less extreme concentration upon this concept in both listening and composition.

abstract and *abstracted* syntax, and one of discourse, between *aural* and *mimetic* discourse. The syntax of the work may, for example be abstracted from the material in some way, whether through reduced listening *à la* Schaeffer, or through attention to the organisation of sounds in the environment (Emmerson gives the example of Luc Ferrari's anecdotal montages), or imposed upon sounds, through, for example, serial techniques. Within this framework, the narrative 'syntax' of Wishart's *Red Bird* is, in a sense to be regarded as abstract, as it is imposed upon material. Along the axis of discourse, attention may be drawn to the mimetic aspect of sounds, their pre-existing connections with reality, or removed from this reality by attention to their qualitative nature.

Emmerson's analyses of a number of works illustrate the ways in which these axes are to be found in a cross-section of works, in all possible permutations. The analyses constantly stress the way in which compositional techniques may be viewed in *relation* to the materials employed. However, although Emmerson stresses the role of perception in defining whether syntax may be abstract or abstracted, and discourse mimetic or aural, his analysis remains firmly in the realm of *function* as opposed to perception. Although one can argue that the employment of a serial procedure or the imposition of a narrative is an abstract process in relation to composition there is no reason to assume that for the listener such a distinction will be applied in the same way. The perception of a narrative could occur whether or not serial techniques are used to organise the material, and the grounds for 'imposing' a narrative must be considered, from the perspective developed in Chapters 2 and 3 of this thesis, *abstracted* from our coevolution with a structured environment. Similarly, an aural practice may be heard mimetically, or vice versa. The contingency of interpretation makes any predictive relationship between function and perception extremely unlikely. Nonetheless, it is clear that in functional terms, the materials and techniques involved in an acousmatic piece

are described as interacting, as having a number of possible relationships, and recognition is made of the fact that in composing an acousmatic work, the materials and techniques applied to them may *both* reflect the structure of the world (mimesis) or be in some sense in contrast to this structure. For acousmatic music, it is clear that a simplistic distinction between form and content is inappropriate, since either may be drawn from attention to the environment. Moreover, the acousmatic work, viewed as it is by composers such as those cited here, can hardly be characterised as *autonomous* in any simplistic fashion: if both material and technique may as easily draw upon aspects of the world as impose upon them, then one cannot argue, for example, that despite the mimetic aspects of its material, compositional technique merely imposes unrelated and abstract structures upon such material.

It is clear from the analyses presented in Chapter 3 that similar relationships may play an important role in the interpretation of acousmatic works: the intrinsic structure of an acousmatic work, its virtual environment, despite its contingency upon extrinsic motivations, is contrasted with the real environment. The narrative that may develop from a sequence of events, for example, serves not only a narrative *per se*, but as the grounds for connecting elements within the piece. Hence, despite the challenge to musical autonomy that acousmatic music could be seen as providing, such a challenge does not provide grounds for rejecting autonomy out of hand. Similarly, although the functional concerns addressed above suggest that acousmatic works challenge a simplistic view of musical autonomy, certain aspects of a work's construction may be regarded as autonomous in *relation* to those aspects that are derived directly from the environment. In order to clarify the nature of any challenge to musical autonomy acousmatic music might represent, a thorough critique of musical autonomy is required. For the moment it will be assumed that such a challenge is present both in the discourse surrounding acousmatic

composition, and within its interpretative potential. From both functional and perceptual analyses of acousmatic music one can conclude that the autonomy of the musical work is under threat, through being encroached upon by an attention to the relationship between the work itself and its context, its mimetic aspect. As already argued in Chapter 1, such attention represents a challenge to the dominant ideologies of *reduced listening* where the composer is asked to place the everyday associations of sounds within phenomenological brackets (Schaeffer, 1966; Chion, 1983), and of abstract views of timbre which attempt to reduce complex sounds to a parameter of the same kind as pitch or time (e.g. Schoenberg, 1973; Wessel, 1979; McAdams, 1994). Here however, it will be interpreted within a wider debate regarding the autonomous nature of the musical work. As will become clear, the acousmatic work is both an autonomous and a mediate form: it does challenge musical autonomy, but simultaneously redefines the nature of this autonomy in relation to the world in which it exists.

The view of music as an autonomous form finds its apotheosis in the claims of Hanslick:

> "The ideas which a composer expresses are of a *purely musical* nature..."
>
> (Hanslick, 1974, p. 35; also see section 1.3, this thesis)

Adorno, whose work will be used as a framework for discussing the aesthetic nature of acousmatic music, is another upholder of the autonomy of the art work and might seem an odd choice to form the basis for an aesthetic analysis appropriate to studying such an openly mimetic art-form. However, as will be argued below, Adorno's theories on the nature of art and its relationship to the world (e.g. Adorno, 1984) provide for an enlightening analysis of the *critical* potential of acousmatic music.

For Adorno, the ability of the art work to separate itself from social forces through its autonomous, even monadic, character is of central

importance to aesthetics. The development of a culture industry, in which art works become commodities whose possession and exchange are definitive, and the related increase in the immediacy of cultural artefacts, necessary for their status as mere gratification (Horkheimer and Adorno, 1973, pp. 120-167), deny such autonomy. The threat to the autonomy of the art work presented by the technology of mass production and the "psycho-technology" (Horkheimer and Adorno, 1973, p. 163) of the gratifyingly familiar is more than just an attack on the art work itself. Such techniques are seen to reduce the art work to a socially defined and defining role, rather than a critique of society. The art work, through its loss of autonomy, becomes complicit in the "economic coercion" that is seen to characterise society (Horkheimer and Adorno, 1973, p. 167). This context would suggest that the attention to mimesis in acousmatic music, and its reliance upon technological means to this end, would be anathema to an Adornian critique. Such reliance upon immediacy, familiarity and technology are the methods of the culture industry. Moreover, the ubiquity of such means across the supposed boundaries between 'high' and 'low' art, or between commercial and 'cultural' interests, again suggests a collapse of distinctions necessary for the production of autonomous works, reminiscent of the conflation of culture and advertising seen by Adorno and Horkheimer (1973) as a primary symptom of the growth of culture as commodity. Paddison suggests that:

> "...the effects of the cultural pluralism and relativism which have come to characterize the period since the 1950s, and the 'new simplicity' and accessibility which have become such a feature of the music of the later part of the twentieth century, can also be interpreted in terms of Adorno's theory. From Adorno's perspective, such developments could be seen only as regressive, the reversion of the elements of musical material to their pre-rational, pre-autonomous condition."
>
> (Paddison, 1991, p. 279)

However, through applying Adorno's methods anew, this regressive interpretation of contemporary musical culture can be seen to find a

redemptive complement in the attempts of musicians to grapple with the relationship between materials provided by the 'real world' and their presentation as elements within musical works. Adorno "was no Luddite" in his attitude to technology (Levin, 1990, p. 24) and his dialectical approach to the musical work may provide a far less threatening understanding of mimesis than generally acknowledged. In order to show this, however, it is necessary to outline Adorno's conception of the dialectical nature of aesthetics.

4.1.2 Mimesis and rationality

Central to Adorno's view of aesthetics (e.g. Adorno, 1984) is the dialectic between mimesis and rationality; between the representation of reality and the abstract techniques through which such reality is mediated within the art work. Art, therefore provides an image of enlightenment: just as our rational endeavours provide us with means to exploit and control our surroundings (Adorno and Horkheimer, 1973), the artist is engaged in domination of his or her material. This image, for Adorno, contains redemptive possibilities, in that a particular art work may present a monadic, autonomous artefact which cannot be reduced to, or exchanged with another. Such an art work requires individual contemplation, and through such contemplation the relationship between mimesis and rationality within that work provides an instance where domination is divorced from its everyday consequences. For Adorno, individual art works may provide the only version of our rationality which refuses to engage with the world in a direct manner; an engagement which in normal circumstances has led to an alienation from both nature and our fellow human beings:

> "Men pay for the increase of their power with alienation from that over which they exercise that power. Enlightenment behaves towards things as a dictator towards men."
>
> (Horkheimer and Adorno, 1973, p. 9)

Adorno's view of mimesis, as Paddison (1991) notes, is viewed in an anthropological light. Mimesis is not merely the re-presentation of nature. Instead, mimesis is that which precedes rationality, a state in which 'primitive' man establishes power over things by imitation (Paddison, 1991, p. 272). This view is made explicit in the critical reading of the Odysseus myth provided by Horkheimer and Adorno (1973, pp. 43-80). In broader, aesthetic terms, this view of mimesis as a totemistic, shamanistic process leads Adorno to associate mimesis with 'primitive' art. This view of mimesis as a primitive, or pre-rational, process is contrasted with the rational domination of things which demands objectivity, rather than shamanistic identification with objects. Adorno's aesthetic, in as much as it presents art works as the products of enlightened rationality, consistently implies the dialectical relationship of these primitive and enlightened forces.

4.1.3 Material and technique

Eschewing what he calls the "philistine" distinction between form and content, a decision quite in keeping with the perspective on acousmatic music developed in section 4.1.1, Adorno introduces the notions of *material* (Adorno, 1984, p. 213) and *technique* (Adorno, 1984, p. 303). These two notions and their dialectical relationship mirror the relationship between mimesis and rationality. Adorno describes material thus:

> "Material...is the stuff the artist controls and manipulates: words, colours, sounds—all the way up to connections of any kind and to the highly developed methods of integration he might use. Material, then, is all that the artist is confronted by, all that he must make a decision about, and that includes forms as well, for forms too can become materials."
>
> (Adorno, 1984, p. 213)

Here Adorno unifies form and content: for a composer, a stylistic convention, or a form, is as much material as a particular instrumental sound. Technique,

on the other hand can be described as the "mastery of materials" (Adorno, 1984, p. 303); technique is the skill with which the artist "controls and manipulates" his or her materials.

For Adorno, material and technique exist in a dialectical, rather than dichotomous relationship (Adorno, 1984, p. 213; p. 304). Just as techniques determine the way in which materials are mediated by the art work, so material itself determines the techniques which are appropriate. Adorno states of material:

> "Unreflective artists believe that they can choose materials as they please. This is of course completely wrong. There are inescapable constraints built into materials, constraints that change with the specific character of the material and which determine the evolution of methods. The state of the material largely also determines innovative expansion into unknown areas."
>
> (Adorno, 1984, p. 213)

Similarly, despite the constraints provided by material, the development of technique "is a growth of freedom and of conscious discretionary power over means" (Adorno, 1984, p. 303). The dialectic of material and technique is that of mimesis and rationality, mimesis being the domain of the pre-existent, rationality that of the enlightened conscious agent. One should not, however, mistake mimesis for the representation of *nature*; material in art is already contingent upon previous technical developments and is "formed" by such means:

> "Material is always historical, never natural...Materials are just as dependent upon technical changes as technique is on materials worked upon by it. Clearly, the composer who works with tonal material takes it over from tradition."
>
> (Adorno, 1984, p. 214)

This interdependence of material and technique motivates Adorno's attitudes to many compositional practices. His assessment of Schoenberg's adoption of atonal and then serial practices (Adorno, 1973) rests upon the notion that Schoenberg's material, that of late tonality, demanded new

techniques. That these techniques generated a new body of material for composers such as Boulez and Stockhausen, that of 'serial technique', shows the peculiar way in which material and technique are dynamically entwined.

This view of the relationship between material and technique, where mimesis is constrained to pre-existing *musical* artefacts, can be interpreted as being the defining principle of the autonomous work. A musical work retains autonomy from the world through its mediation of musical forms which are already mediate and autonomous. It is this which prevents the fetishistic and 'regressive' nature of mimesis from threatening the work's monadic isolation, whilst maintaining a connection with social forces through its reproduction of enlightened domination:

> "It is the dynamic and oppositional relationship to received formal norms within the structure of the musical work which enables the work to speak. At the same time, however, the received norms, as musical material, also carry with them the 'meanings' associated with their previous functionality...Thus, music is 'meaningful' and 'language-like' to the extent that this received, preformed musical content, already socially mediated, is recontextualised within the form and structure of the individual work. This process also serves to distance the material from its previous functionality, without, however, being able to destroy its associative residues."
>
> (Paddison, 1991, p. 278)

However, to suggest that the autonomy of the musical work relies upon this alone would be incorrect. It is not just the mediate nature of musical material that ensures the work's "distance from its previous functionality". Rather it is the "process" of mediation itself that provides such distance (Paddison, 1991). A more traditional view of mimesis as representation of reality can find a place in this formulation. Indeed, as will be argued below, the present state of musical material, its relationship to technique, and the form this dialectic takes within acousmatic music both in terms of its production and interpretation can be shown to demand closer attention to this 'primitive' force and to the technical means by which it may be mediated.

4.1.4 Expanding mimesis

In *Aesthetic Theory*, Adorno proposes that it is fallacious to propose that material can escape from its historical nature. Even when composers "ruthlessly extinguish all traces of tradition" by working with "autonomous material purged entirely of phenomena like consonance/dissonance, triad, diatonicism, etc...." (Adorno, 1984, p. 214) material remains bound up in history by virtue of its concrete negation of that history. Merely by adopting non-traditional material, the musician affirms the historical nature of material, whether this is intentional or not. One can view Schaeffer's desire for a new "language" of music derived from the process of "reduced listening" (Schaeffer, 1966) as an attempt to extinguish tradition, the tradition of notational reification, of serialism, as indeed Schaeffer himself viewed his theoretical and practical experiments (Chion, 1983 p. 40). This view of material is as historically mediate as that of any composer attempting to develop the Viennese tradition; material in such an approach as Schaeffer's is bound up in the history of music by its very negation of historical linearity. Indeed it is pertinent to note that both the serial and acousmatic views of material originate in such apparent negations of tradition. Similarly, these apparent negations have led to the construction of bodies of theory that lead one to talk of the 'serial' or 'acousmatic' traditions.

The usage of sounds for their everyday significance provides material that has a history, but one that is not necessarily musical. However, the relationship between material and technique is potentially of a different nature in the case of acousmatic music. Here, material has the potential for radical dislocation from the matrix of musical history, to be *immediate* rather than mediate. The world of everyday perception intrudes into the fabric of musical discourse. If, like Adorno, one wishes to speak here of the dialectic of mimesis and rationality, more specifically of material and construction, these changes in the nature of material are far from trivial. Rather than the

enlightened domination of musical material, a historically mediate construct, acousmatic works have the potential for exploiting auditory information for the raw, directly perceivable environment. In this sense, utilisation and interpretation of acoustic structures in acousmatic music may seem closer to the magical or "primitive" art defined by Adorno as pre-rational and unenlightened in its mimetic *force-majeure* (See Horkheimer & Adorno, 1973). However, it is far from the "primitive art" described by Adorno, in that such material is subject to the rational domination, the technical articulation, that exemplifies enlightened artistic endeavour. The stuff of our everyday perceptions is dominated by every available technical means. As such the dialectic of mimesis and rationality is presented in its starkest form. Reality is subjected to manipulation, rather than the acculturated residue of reality that forms the material of instrumental and vocal composers.

Nevertheless, despite the mediation of reality that occurs when identifiable sounds become material subject to manipulation, their immediacy does defy the autonomy of the art work. Through choosing a broader definition of mimesis, the musician implicitly or explicitly acknowledges the narrative and gestural qualities of sounds that are distanced through the mediate nature of conventional musical materials. What does this broader view of material lead one to say of the dialectic between autonomy and social commentary? It is suggested here that the obsessive technical domination of sound may be the strongest exemplar of the force field that lies between the social and autonomous in art. The dialectic of material and construction is here at once a mirror-image of enlightened barbarity towards things as they are and of this barbarity's negation in its avoidance of direct involvement in the social sphere. The musician, rather than directly manipulating the world, manipulates and represents its recorded image in a new form. In the classical musique concrète studio recorded tape is cut and spliced and the environment is left unblemished, yet the image of this razor-blade attitude towards the

environment remains. Simultaneously, material laden with immediate value is brought into the autonomous sphere by its removal from the everyday.

In order to understand the historical context within which such unmediate forces usurp conventional musical material, it is necessary to return to Adorno's own writings upon the avant-garde of the 1950s and the development of electronic music. Despite the potential for techniques to become materials through their historical sedimentation, Adorno stresses that a conflation of material and technique, a situation in which the composer blindly follows particular procedures, leads to stagnation and aesthetic impotence. It is in the non-identity of material and technique that aesthetic possibilities are held. Adorno's views upon integral serialism concentrate upon the way in which the blind application of serial procedures can become an end in itself: a work becomes validated by its correctness rather than its balance between material and technique. In a number of articles which discuss the increasingly "technical" nature of music in the 1950s and the "aging" of the avant-garde, its becoming a static, monolithic tradition, Adorno constantly stresses the need for composers to be critical of their materials, whether these are serial techniques or electronic media (Adorno, 1977a & b; 1988). This form of critique ensures that what Adorno prizes most highly, the immanent structures of individual works, contain within them both a knowledge of the implications of their materials and a technical mastery that is based upon the individual struggle of the artist against all that is seemingly pre-ordained by those implications.

At first acquaintance, Adorno seems to associate electronic music with "reified consciousness"; just as the "new music" in its attempts to be ultra-rational thus becomes a static and inhuman, an almost industrial practice, the same critique is levelled at electronic music:

> "Hyper-modernism, including much of electronic music, prefers to join forces with reified consciousness rather than stay on the side of an ideology of illusory humanness. Dissonance thus congeals into an indifferent material, a new kind of

> immediacy without memory trace of the past, without feeling, without an essence."
>
> (Adorno, 1984, p. 22)

Just as atonal music loses the shock of dissonance in its development into serialism, so electronic music attempts to make up for the mechanisation of music implied by integral serialism by further mechanisation. Adorno also notes the dangers of turning electronic music into a pseudo-science (Adorno, 1984, p. 463); such a tendency would imply a similarly inappropriate validation of artistic methods and results as that of the technical correctness he criticises in the avant-garde. However, his criticisms of electronic music are just that, criticisms of electronic *music*. There are aspects of the technology involved in the production of electronic music that are to be viewed with cautious enthusiasm. Despite his belief that electronic music can accentuate the hyper-rational within music, Adorno argues that the technology of electronic music itself may form the basis for maintaining the dialectical relationship between the mastery of the composer and the demands of material (Adorno, 1977a). This argument, however, betrays a broader view of mimesis. He suggests that the tensions in the art work between technique and material, lost through the dominance of fixed and objective compositional techniques, can be regained through the replacement of the fragmentational forces of dissonance by using reference to the "technologized" world. Adorno here makes reference to Edgar Varèse, whose work

> "...bears witness to the possibility of musically mastering the experience of a technologized world without resource to arts and crafts or to a blind faith in the scientization of art. Varèse, an engineer who in fact really knows something about technology, has imported technological elements into his compositions, not in order to make them some kind of childish science, but to make room for the expression of just those kinds of tension that the aged New Music forfeits. *He uses technology for effects of panic that go far beyond run of the mill musical resources.*"
>
> (Adorno, 1988, p. 109; emphasis added)

Adorno here suggests not only that "run of the mill musical resources" may no longer be sufficient to create tension within the work, but also that it is the more conventional reading of the term mimesis that is at work. Reference here to technology is seen as direct and a force outside the dominant musical tradition is called upon to restore aesthetic values. Despite Adorno's conflicting concern with maintaining the mediate nature of material, shown in his concern that electronic music fulfil a historical necessity (e.g. Adorno, 1977a, p. 138), it is clear that he was aware of the challenges to such musical material inherent within its self-referentiality. It is in this sense that the threat of mimesis to autonomy must be balanced against the collapse of musical material into impotence. Far from being merely regressive, the enrichment of musical material can be viewed as a response to hyper-modernism that is quite in keeping with Adornian critique. Moreover, although the productive side of Adorno's critique has been concentrated upon up to this point, the interpretative consequences of the expansion of mimesis are just as great. The interpretation of works, not just in relation to a musical context, but in relation to the whole environment, have a similarly refreshing consequence: just as a composer's enrichment of the mimetic aspect of material provides a critique of traditional musical material's impotence, the listener, in attempting to interpret the relationship between intrinsic and extrinsic, between real and virtual, is placed in a position between two dialectical forces. For the listener, the acousmatic piece provides a potential critique of his or her everyday engagement with the world, and all the consequences of this engagement.

Adorno has little to say about the explicit use or interpretation of everyday events so important to acousmatic music. However, as has been argued, his views on contemporary music imply a far from dismissive attitude to the implications of such an expansion of mimesis. Before readdressing acousmatic more directly, Adorno's views on recording technology should be noted. Although Adorno seems largely unaware of the use of such technology

in the composition of music, and hence offers little of direct value to discussion of its critical potential in this form, his views on recorded music do provide additional context within which to address such matters.

4.1.5 Technology and the musical work

The phonograph, being one of the primary means by which culture becomes industrialised, would seem to demand Adorno's full polemic wrath. However, just as the technology of electronic music is only one aspect of its aesthetic status, phonographic technology itself is not the only issue here. Although the development of the recording industry facilitates mass production and distribution of art works and their subsequent reification as objects of exchange, the technology in question can also be seen as providing the means for combating such tendencies. Moreover, Adorno, despite his mistrust of mimesis, presents a view of the phonograph which is strangely constructive, rather than merely reproductive (Adorno, 1990a, b & c; Levin, 1990). This tendency, although far from explicitly calling for use of the phonograph and other recording technologies as musical instruments, suggests that as for film, where montage provides the means for escaping from unmediated mimesis (Adorno, 1981/2), it may be through montage techniques that the aesthetic value of the phonograph will be found (Levin, 1990).

In his essay *Opera and the Long-Playing Record*, (Adorno, 1990c) as Levin (1990) correctly notes, use of the LP as the means for a montage-based listening technique is advocated. The possibility of repeated and fragmentary listening is represented as a method for avoiding the "neutralization" of operatic works through their museum-like captivity in the opera-house (Adorno, 1990c). Levin (1990), in interpreting this approach as being parallel to Adorno's view of cinematic montage (see Adorno, 1981/82), fails however to note the significantly different natures of montage in these two domains. Whereas the events that make up a film montage may be from any source, and

hence run the risk of being mimetic in a traditional sense, the results of such a broad mimesis are not foreseen for music. Although Adorno claims that

> "The gramophone record becomes a form the moment it unintentionally approaches the requisite state of a compositional form"
>
> (1990c, p. 65)

there is no discussion here of the consequences of presenting a montage of recordings of one or many works *as* a composition. Neither does Adorno give us any clue here as to the consequences of producing montages of so-called real-world, or everyday sounds. What is important here is that Adorno hints at the redeeming quality of recording technology, that it not only translates what is recorded into an item of exchange, but also provides a means for transformation. Through the fragmentation and repetition of a recording it is possible to transform a static and potentially lifeless artefact into a compositional and inherently critical form. Presenting such a montage as a composition, as an 'autonomous' work is no more contradictory than the mediation of traditional musical materials in Adorno's conception of music. Moreover, taking into account the added transformational possibilities afforded by both analog and digital processing of sounds, technique as the "mastery of materials" (Adorno, 1984, p. 303) need not focus upon the recording in a one dimensional fashion. The musician may create a narrative structure, based upon the immediate force of sounds' everyday references, or focus upon the gestural qualities of sounds, but such mimetic approaches may be seamlessly combined with attention to the abstract, timbral connections between sounds. The technical aspect of the work becomes necessarily responsive to such decisions. Whether a composer wishes to acknowledge the direct significance of a recorded sound or not, such significance is at issue. Indeed, by avoiding recognisable sounds in the finished work, a musician silently acknowledges such sounds' force. Moreover, by acknowledging and responding to this force, the musician does not become a primitive. By

exploring the mimetic potential of sounds the critical nature of autonomous art is at work. The ubiquity of recorded music and sound finds its critical counterpart in such processes. Adorno apocalyptically describes recordings as:

> "The black seals on the missives that are rushing towards us from all sides in the traffic with technology; missives whose formulations capture the sounds of creation, the first and last sounds, judgement upon life and message about that which may come thereafter"
>
> (Adorno, 1990b, p. 61)

Through the critical process of transformation, the creative supplement to such a reification of sounds brought about by recording technology is to be found. Just as the broadening of mimesis is at once a threat to the critical distance between musical work and reality and a reinvigoration of the potency of this distance, the technology of recording provides its own critique in its adoption as a creative potential.

In relation to acousmatic music, Adorno's critique of recording technology serves the same purpose as his critique of electronic music. Just as an expansion of mimesis through the inclusion of non-musical materials can be justified in critical terms, recording technology utilised as a productive, transformational force, can be seen as critical of this technology's tendency to merely copy reality. Through combining these two tendencies, acousmatic music avoids both the hyper-rationality of the modernist conflation of material and technique, and the potentially 'regressive' nature of audio technology. Domination of reality through technology is a characteristic of western society, just as is the tendency towards the self-sameness of western society's artefacts through mass production. Through subverting the use of technology, the acousmatic composer both reflects technology's dominating presence in society, yet uses such technology to aesthetic ends. The acousmatic work, due to its reliance on audio technology, may be seen as both a reflection of the industrial process, yet simultaneously shows how such a process may retain

autonomy through its response to the immanent demands of artistic production.

4.1.6 Acousmatic music and the image of domination

As noted in section 4.1.1, acousmatic music, for both listener and composer, can be seen to challenge the self-referential nature of music. In critical terms, this challenge is expressed through the relationship between material and technique: the demands placed upon technique by the new materials made available by electroacoustic technology, and the dialectical relationship between these demands and the actions of the composer. For the listener, although the distinction between material and technique may be less clear, the conflict between real and virtual environments provides a similar dialectic. The critical potential of this dialectic lies in the position of the listener in relation to the 'work'. Adorno suggests that aesthetic experience relies upon a parallel dialectic to that of mimesis and rationality in the production of art works: the mimetic aspect of listening is the desire for undifferentiated identification with the work, the rational being expressed through the denial of this desire (Adorno, 1984 pp 343-348). The prototypical illustration of this dialectic is to be found in Horkheimer and Adorno's interpretation of the myth of Odysseus and the Sirens where Odysseus is bound to the mast of his ship, in order that he might listen to the Siren's song without being controlled by it. Odysseus places himself in a position where the desire to join the Sirens is counterbalanced by the decision to prevent such an occurrence. Odysseus places himself in a position where the desire is all too real, but cannot be gratified (Horkheimer & Adorno, 1972 pp 3-80). In the case of acousmatic music, desire and its avoidance are in no way as extreme. However, the Adornian notion of the "tremor" which results from the holding back from the work (Adorno, 1984 pp 343-348), for which the Sirens myth provides the blueprint, is important here: events are perceived which are normally laden

with *affordances*, affordances that invite and constrain action, whereas in the context in which they are perceived such affordances become transformed, dislocated, inappropriate. Interpretative action is here the counterpart of perception: events are perceived, yet our actions are deferred or exploratory. In a certain sense Gibson's entire ecological project (e.g. Gibson, 1966; 1979) is underpinned by the relationship between the needs of an organism and the potential of the environment to provide for these needs. In aesthetic terms the notion of desire and gratification is implicit within his approach: the organism perceives the world as it does because it requires food, water, sex, sunlight and so on. The acousmatic work makes available acoustic structures which specify events that might be 'desired', or used directly by the listener in order to fulfil such 'desires', but the actions that result from their perception are interpretative. The acousmatic work provides the opportunity for a critical attitude towards the everyday environment, one in which desire for an object or event can never be fulfilled. This 'autonomy' only gains its critical power in relation to the everyday affordances of objects or events. Reality is not obscured by acousmatic music, but available in such a manner as to afford a different perspective upon our relationship to it. In Adornian terms, the acousmatic work presents a focus for domination of the world by the composer, yet a domination which is independent from direct intervention in the world. As such it provides an image of domination which, although resembling that which occurs in everyday life, is to be seen as providing the possibility that the process of domination need not be alienating (see section 4.1.2).

For the listener, this image of domination depends upon, yet is simultaneously in opposition to, our direct relationship with the world, a relationship characterised by the constraints of survival value. Although the perception of cultural artefacts may be considered in the same light as any other kind of perception (see Chapter 2, section 2.2), as contingent upon a

shared yet *human* environment, such artefacts may also be considered the combined traces of individual interpretative actions. Such traces are the result not only of a direct relationship with the world, but of the ability of human beings to develop multiple interpretations in the face of impoverished information. In the case of acousmatic music, impoverished information is available within a context that affords a most extreme example of this process. Whereas explicitly musical events are already impoverished in relation to the everyday environment, acousmatic music retains invariant structures for events which are of everyday concern, intensifying their dialectical opposition to the immediate concerns of survival. Acousmatic music provides a critique of the links between action and perception, and at the same time provides a critique of the separation between music and the everyday. It directly challenges the listener to reassess both the relationship he or she may have with the world, and the relationship between musical and everyday structures which he or she may have perceived through familiarity with traditional western music. Just as a compositional attention to mimesis may be seen to refresh a musical culture in which material and technique have become undifferentiated, the differentiation of musical autonomy and mimesis becomes refreshed for the listener.

Similarly, despite the close relationship between technology and technique in the development of acousmatic music, the listener is presented with a technological art-work which both reacts to technological developments yet shows how these developments may contain within them their own critique. Acousmatic works resemble recordings, yet show how recording may be more than pure mimesis. If, as Adorno argues, modernism has collapsed under the weight of its technical and technological resources, then for both listener and composer, the dialectical nature of acousmatic music provides one solution to this collapse. As will be shown in the next section, acousmatic music, although presenting particular challenges to the listener,

composer and theorist, reflects issues of importance both to musical culture and the relationship of this culture to the society in which it functions.

4.2 Acousmatic music and contemporary musical culture

4.2.1 Exclusion and inclusion: musical and social constraints

Acousmatic music points toward a version of musical autonomy which is inclusive rather than exclusive. The autonomy of the acousmatic work, as argued above, does not rely upon its exclusion of non-musical material or the interpretation of acousmatic works within a purely 'musical' context. Rather, the acousmatic work represents a dialectical relationship between its intrinsic and extrinsic aspects. Hence, it clarifies the distinction between autonomy and exclusivity: autonomy, in a dialectical sense, may be achieved without excluding the role of the everyday environment in composition, listening or theory.

This inclusivity of the acousmatic work has social consequences. Wishart (1985) suggests that the development of western musical practice can be viewed not only as an ongoing process of excluding various kinds of material and technique but as an attempt to exclude sectors of society from musical involvement. He introduces the notion of a "scribe-culture" (Wishart, 1985, pp. 7-28) in which only certain members of society, through their privileged knowledge of musical notation and theory, seek either implicitly or explicitly to prescribe musical practice. This scribe-culture is seen to prioritise certain notatable features of music, mainly discrete pitches and durations at the expense of continuous changes along acoustic continua. Electroacoustic techniques, as seen in acousmatic music, contain within them the potential to challenge notational and theoretical dogmas of this kind. Through its potential for musical inclusivity, music potentially becomes socially inclusive, through

presenting a practice within which the features of music excluded by this scribe-culture become increasingly important. This inclusivity does not just extend to attention to the qualitative aspects of timbre, but also to the expansion of the relevance of mimesis in both composition and listening, both in terms of articulating intrinsic aspects of the work and providing a greater role for extrinsic aspects of interpretation.

The notion that acousmatic music provides for social inclusivity, however, is not an *a priori* feature of such immanent inclusivity. Its social potential is just this, a potential for change. In critical terms, the acousmatic work might provide a critique of social exclusion from the musical domain, but it does not in itself provide a panacea for such social exclusion. The practice of acousmatic music remains within a largely academic community, relies upon technological resources which are financially exclusive and still remains an art-form which is the preserve of a small sector of the community. Regardless of the challenge it may present to the ideologies underpinning and arising from traditional music theory and notation it does not provide a direct means for such change. Indeed, in Adornian terms, such change is not to be wished for: acousmatic music should not become directly involved in the social sphere if it is to retain its critical potential.

Regardless of whether changes in the social aspect of musical practice should be generated through the practice of acousmatic music, a number of parallel changes in the relationship between technology, music and society may be observed. The ubiquity of the digital sampler and an inclusive attitude to musical discourse can be observed in musical practices which are widely distributed across social divides. Popular musical practice, whether integrated within instrumental and vocal forms through traditional studio techniques or more radically inclusive, for example in the use of samples in electroacoustically produced dance music, seems to reflect a process parallel to that of so-called 'serious' music. Although such practices are beyond the

scope of this thesis, the next two sections will examine the relationship between acousmatic music and other genres which might benefit from a more inclusive view of musical discourse.

4.2.2 Quotation and sampling: 'noise' and the cultural scrapheap

Despite the explicit exclusion of instrumental and vocal music from this thesis, it would be wrong to ignore the parallels between the inclusivity of acousmatic music and its manifestations in other genres. Critical responses to the processes of recording and mass production of music are not only to be found where musicians exploit these processes themselves through using such technologies. Although the technical processes afforded by audio technology show its role in providing the means to criticise itself, related *technical* developments can be observed in all kinds of music. Although quotation and montage have a long history in western musical culture, reaching an extreme in works such as the third movement of Berio's *Sinfonia*, the obsession with such techniques has become a defining characteristic of contemporary musical culture. The savage version of postmodern plurality presented by John Zorn through the sudden juxtaposition of stylistically unrelated music in an improvised setting is as much a comment upon the levelling nature of the recording industry as it is a response to intra-musical demands. Through such anti-contextual techniques one may appreciate the differences between elements of musical material garnered from what Paddison refers to as "the cultural scrap-heap" (1991, p. 279). *Integrating* references to a plurality of musics within a piece merely reproduces the deadening nature of the recording industry, where recordings are reduced to their exchange value alone; through refusing such integration the material takes on more than just its face value and becomes a critique of the self-sameness that threatens to associate plurality with identity.

Similarly, the widespread practice of sampling and the use of turntables to create new pieces in popular music is more than just a labour-saving tactic. The challenges to the ownership and financial value of material within the recycling and recontextualising of fragments that are regarded as representing valuable commodities again seem to strike at the culture industry from within. This is far more than just 'theft' in the sense that bootleg recordings enable one to possess music without paying for it. If this were so, loss of revenue would be the main industrial fear. Here, however, it is the ownership of material itself that is at issue; it is difficult to argue that a sampled fragment from a record can be bought and sold in the same way that a complete bootleg could be. The originator of the sampled material invests time and effort and money that are 'stolen' through sampling; and where samples are used by permission the ownership of the original material is just as fundamental a concern. It seems that musicians often forget the historically mediate nature of their own sources. The exploitation and appropriation of material does not require a sampler; this process is well known within jazz through the creation of new standards from the framework of older tunes. Musicians continually 'steal' from one another; the difference here is that rather than merely copying, developing or arranging old material, the musician with a sampler may combine such materials in such a way as to ignore their traditional usage entirely. Samples may be used to refer to styles of music in a fetishistic manner, but such reference simultaneously reflects the moribund nature of recorded music, and as such should not be seen as merely invoking the ghosts of conventional musicians, but as part of a broader, critical phenomenon. Of course, such critique depends upon the manner in which sampling is employed, and it is not my intention to present the use of samples as a solution to aesthetic problems in itself. The practice of sampling is both symptomatic of the technological nature of contemporary music and

potentially critical of the commodification of music; as such one would be wrong to ignore the primary area in which it occurs, that of popular music.

Sampling (including analog sampling) and quotation can be seen as directly analogous to processes relevant to acousmatic music. Just as acousmatic music's dialectic between inclusion and autonomy transforms musical listening through demanding attention to our everyday surroundings, so do these practices. Indeed, many aspects of these practices deny any real division between acousmatic music and the practices of many popular forms. Much contemporary dance music shares technological, material and technical resources with acousmatic music. Similarly, acousmatic compositions, such as Alvarez' *Mambo a la Braque*, use technology to draw upon, transform and recontextualise existing musical recordings. In a sense, much of contemporary music seems to demand of the listener a reversal of the traditional distinction between music and noise. Through montage techniques, musical material is juxtaposed with scant regard for its intrinsic structural features, treated as if it has the same status as any other extrinsically significant reference to our everyday surroundings. Conversely, through bringing into the sphere of music sounds of previously banal, everyday significance, the listener is made aware of the intrinsic 'musical' potential of the sounds of everyday events. These parallels are not causative: it is not suggested that acousmatic music has caused changes in other musical practices, or vice-versa. Nor is it suggested that this reversal is a *consequence* of the ubiquity of audio technology either as a source for material (through recordings) or an influence upon musical techniques. However, it is suggested that acousmatic music shares aspects of its critical potential with a number of other musical practices. In the next section, the relationship between pure montage and transformational approaches to composition will be considered in relation to the listener. This analysis will reveal how divisions between 'high' and 'low' culture may be found in the different environments within which listeners might perceive the

extrinsic and intrinsic aspects of musical compositions, rather than in the immanent properties of works themselves.

4.2.3 Intrinsic and extrinsic elitism: high and low art

As argued in chapter 3, the interpretations which a listener might make of an acousmatic piece are contingent upon the particular environments available to that listener. This being the case, although no value judgement is proposed regarding the aesthetic merits of different music practices, the practices of montage and acoustic transformations can be shown to reflect different interpretative environments. Moreover, the particular 'materials' utilised and a listener's interpretation of these materials will be shown to be equally contingent.

If one aspect of the axis between inclusion and exclusion is to be found in the use of materials traditionally regarded as non-musical, and interpretations of musical works in relation to the everyday environment, another may be found in the division between so-called 'high' and 'low' art. According to simplistic views of musical autonomy (see Chapter 1), music should place priority upon the intrinsic consequences of its material, rather than upon its connections with the environment. If one superimposes this view upon acousmatic music, then regardless of the way in which pieces might inform us about the environment, extrinsic connections might be regarded as being most important in their creation of intrinsic structures, Hence, for example, the narrative use of sounds in a piece such as Wishart's *Red Bird*, might be regarded as important due to their value in forming intrinsic structures. Within this perspective, the autonomy of the piece is reified at the expense of its mimetic nature. Hence, one might concentrate upon the transformational nature of the acousmatic listening environment, its *virtual* aspect to the exclusion of its informative nature in relation to the real environment. Within a dialectical view, however, without mimesis, autonomy

has no value. Conversely, considering an acousmatic piece as pure montage, where sounds simply inform us about everyday or musical events, ignoring the intrinsic connections which may result from montage techniques is just as simplistic.

Viewing intrinsic and extrinsic aspects of the acousmatic piece as equally valuable to musical discourse suggests that any criticism of the perceived relationship between these aspects is equally simplistic. One might criticise the usage of sounds from the 'cultural scrapheap', pre-existing fragments of music, as being overly dependent upon a listener's familiarity with their provenance. Such criticism is misplaced: a listener familiar with a particular musical environment, whether 'serious' or 'popular', may come to form *different* interpretations based upon this available information in relation to the quotation of particular musical events, but the precise identification of these fragments is not necessary to reach an interpretation. Indeed, acousmatic music has the potential to cross musical genres in such a way as to encourage the search for contextual information which might lead the listener into quite unfamiliar musical territory. For a listener familiar with the popular idiom the context in which interpretation occurs may afford interpretations of a particular piece which are unavailable to another, less experienced listener. Hence, what might be for an inexperienced listener a mere juxtaposition, may be for the more experienced listener an intrinsically structured set of relationships between *events*. However, such an interpretation merely draws upon a different environmental context. It may explain why a listener might find a work 'difficult', but does not preclude interpretation based upon a search for contextual information in the face of impoverished information.

High and low forms of music are defined not by their immanent properties but in relation to the environmental contexts in which they are interpreted. A simplistic value judgement is misplaced here: the intrinsic and extrinsic qualities of acousmatic works are of potentially equal importance to

interpretation, and different environmental contexts afford different interpretative actions. The same is true of the so-called 'low art' use of sampling, musical quotation or indeed the direct employment of everyday sounds. The explicit transformation of sounds through analog or digital signal processing is no grounds for suggesting that low art music merely recycles found material, whereas high art music transforms it. Montage techniques may have *intrinsic* value for the listener, just as transformed and synthesised sounds may come to be interpreted as having *extrinsic* value. High and low distinctions cannot be made on the basis of technique *or* material, and are only relevant to the description of the different cultural environments drawn upon in interpretation.

Failing to take this into account suggests two possible forms of elitism. In terms of material, a particular listener or group of listeners might criticise a work for drawing upon an unfamiliar environment. In terms of technique, one might favour music which seems to place more emphasis upon intrinsic structure. These forms of elitism are linked since both deny the contingency of interpretation. Neither concentrating upon the intrinsic, nor limiting the extrinsic can have predictable results for interpretation. For a listener experienced in the popular idiom a string quartet may simply be information for a particular type of culture, regardless of the intrinsic qualities a 'classical' listener might ascribe to it. Similarly, an acousmatic piece which avoids the direct and recognisable use of everyday sounds may well be interpreted as a sequence of bangs, whoops and crashes caused by electronic or natural sources by a listener unfamiliar with the attempt of the musician to 'limit' the extrinsic aspects of the work. Acousmatic music does not create such contingency, as it may occur in many different musical situations, yet it calls attention to it through emphasising the dialectic between extrinsic and intrinsic, and between mimesis and autonomy.

4.2.4 Technology and social perception

The technological aspect of acousmatic music, more specifically its recorded format, requires comment in relation to the social and individual natures of musical experience. Although it is possible to hear acousmatic music in a concert hall setting, with other listeners, and one can consider the *performance* of acousmatic works in such a context a collaboration between the actions of composer and sound-projectionist, acousmatic music has a rather curious status as a social object. Due to its recorded and fixed form the acousmatic work need not be perceived within such an immediately social setting, nor is there any requirement for involvement by third parties in its performance. An acousmatic piece on a compact disk, analog record, or tape, listened to by an individual, has no lesser status than a concert performance: the context in which listening occurs may be different, but the piece remains essentially the same. A sound-projectionist may alter the acoustic structures available to a listener in many ways, especially through a multiple loudspeaker array, but these changes cannot be regarded as being of the same order as those pertaining to the expressive features of instrumental and vocal performance from a score. Hence, the acousmatic work seems to deny the social aspects of musical experience in two ways. First, the process of creating an acousmatic work is not necessarily a product of composer and performers, and may be entirely individual. Second, the listener's experience may occur in a socially impoverished context: one need not be amongst other human beings in order to perceive such music.

For the listener, this first kind of social dislocation is indicative of the virtual nature of an acousmatic piece. Real musicians cannot be seen to produce the sounds that are heard, and the social interactions between these musicians cannot be observed. However, within the interpretative framework offered in Chapter 3, such impoverishment may be seen to be of value only in relation to the contextual information provided by the environment. Events

and 'causes' may be heard, whether or not these are real or virtual. One would not argue that hearing a recording of an instrumental piece removes all the information one might pick-up which specifies the movements and interactions of and between performers and their instruments (see Chapter 2, section 2.2.2). Nonetheless, however well specified by acoustic information human activities may be, acousmatic music through its widespread avoidance of instrumental and vocal sounds may well not provide such clear information. Hence, acousmatic music does represent a socially impoverished source of information if we consider its acoustic structures alone.

The virtual environment, however, is itself a product of human artifice: its contradiction of aspects of the real environment are a defining feature. To suggest that the actions of the composer are hidden by the acousmatic is as ridiculous as suggesting that the everyday environment has no role to play in a listener's interpretation. The real actions of the composer are not necessarily perceived, but a virtual composer may be assumed through the interpretations of the listener. It is not just sleeve notes or the labelling of acousmatic music as 'music' that specifies intervention in the environment by some agency: one interpretation of the differences between real and virtual environment is that a human being intervenes in the real environment, interfering in its lawfulness. Of course, such an interpretation might be incorrect, but to use this to deny such an interpretation would fail to accept the implications of a contingent view of interpretation. Hence, in a limited sense, acousmatic music may be perceived as a social act, a relationship between composer and listener, despite the possibly virtual nature of this relationship.

The second form of apparent social dislocation seems at first more extreme. However, far from being isolated to acousmatic music, a process of moving from participation in music, the rise of a division between musical performers and listeners and the development of the recording as an art-form of equal yet different status to the public performance can be observed across

music (see e.g. Eisenberg, 1987). However, to argue that this is a socially dislocating force ignores the social interactions which exist between listeners to recorded music. Although one can listen alone, listening in small groups, sharing interpretations through discourse, and using recordings as cultural or economic artefacts, keeps recorded music well within the province of the social. Acousmatic music is no more or less dislocated from society than any other late twentieth century art-form. Indeed, as has been argued in this chapter, acousmatic music provides a relevant critique of recorded music's socially mediate role as a token of exchange. If a dislocation exists here, it is not between music and society, but between music and the human body or bodies. Whereas bodily participation has remained a defining feature of many popular musical genres through dancing, acousmatic music shares with its 'serious' traditional vocal and instrumental counterparts a resistance to bodily participation by the listener. Much of this resistance is socially mediate: dancing during a concert performance is deemed inappropriate even where the music listened to derives many of its structures from existing or historical dance music. One would not expect to find listeners dancing to Beethoven's Seventh Symphony, despite its invocation of dance related structures. Similarly it is considered inappropriate to join in with a musical performance of concert music. The reality of such social constraints is all too obvious: witness the reactions of fellow concert-goers the next time one attempts to involve oneself in a performance in anything but the most limited bodily fashion. Acousmatic music seems to be presented in such a way as to follow the same constraints upon bodily involvement, despite the shared usage of electroacoustic technologies by the 'serious' tradition and the 'popular' practitioners of dance music. In the next section some speculations will be offered regarding the passive, non-bodily nature of musical listening, and the ways in which acousmatic music need not remain within such a partitioned view of musical culture.

4.2.5 Technology and the body

In both Chapters 1 and 2 of this thesis, attention was drawn to the different ways in which the perception of the human body might play a role in the experience of music. In Chapter 1 the increasing attention paid toward the effort of the body in producing music was noted (see section 1.3.4), and in Chapter 2, research was cited which suggested that such bodily involvement in musical performance was directly specified (see section 2.2.2). Barthes (1977b & c) argues that the 'body', in terms both of its involvement in producing music and in its perception through listening, is a factor all too easy to overlook in the study of musical experience. Moreover, he distinguishes between two important bases for building an understanding of musical experience:

> "There are two musics (at least so I have always thought): the music one listens to, the music one plays. These two musics are two totally different arts, each with its own history, its own sociology, its own aesthetics, its own erotic; the same composer can be minor if you listen to him, tremendous if you play him (even badly)— such is Schumann."
>
> (Barthes, 1977b, p. 149)

He goes on to argue that the second 'music', at least in terms of the art tradition, has largely disappeared to be replaced by

> "...passive, receptive, sound music...(that of concert, festival, record, radio): playing has ceased to exist; musical activity is no longer manual, muscular, kneadingly physical...So too has the performer changed...In short, there was first the actor of music, then the interpreter..., then finally the technician, who relieves the listener of all activity, even by procuration, and abolishes in the sphere of music the very notion of *doing*."
>
> (Barthes, 1977b, pp. 149-50)

Although Barthes (1977b) admits that one might look elsewhere for bodily involvement than the 'classical' tradition, his pronouncements on the fate of 'high art' music are tellingly accurate. However, Barthes' view of this shift from active to passive in musical experience is paradoxically seen as being the

defining factor in engendering a rather different view of interpretation. Through the process of removing music from the sensual the musical work becomes autonomous in a sense akin to that described by Adorno (see above). Music becomes something composed not to be played by the listener; but to be interpreted, not something merely to be *received* but to be perceived from the position of "...an operator, who knows how to displace, assemble, combine, fit together." (Barthes, (1977b, p.153). Through becoming opposed to the sensual, music thus becomes a matter of reading, and the listener becomes able to "read" the work, through "writing it anew" rather than merely receiving it through the body. In this way Barthes echoes Adorno's dialectic between the sensual, gratifying nature of mimesis, and the distancing mediation of rationality.

Acousmatic music may be seen as a working part of this movement away from the body. The tape piece, unlike traditional instrumental or vocal music, loses the last vestige of bodily involvement on the part of the listener. In a sense it is the most technical of musical works, involving not performers and instruments but the technical manipulation by the composer of sounds themselves. The body is not involved in its performance, coming as it does from a fixed artefact. However, here too, the acousmatic work is paradoxical. It is both mimetic and autonomous, and we may interpret it according to its links to the sounding world of events as much as through its distance from this world. Moreover, the acousmatic work, through the precise nature of its technical aspect, hints at a bodily involvement beyond that provided by our perception of it in relation to the sounding environment. The recording, synthesis and transformation of sounds through technical means is becoming not a practice for a technological elite, but a potential practice, through the ubiquity of digital sound processing technology, for the 'listener'. Despite the potential distance such technology places between the body and the sounds that are produced, the development of 'virtual instruments' which model the

relationship between action and perception in the production of sounds (e.g. Cadoz, Luciani & Florens, 1984; Cadoz, Lisowski & Florens, 1990, see Chapter 2, section 2.1.2) suggests that within the audio technologies underlying the practice of acousmatic music there may be a movement towards a paradoxical re-integration of the body within musical activity. Although the 'real' links between sound and action may be denied or distorted through the means provided by conventional audio technology, 'virtual' links seem to be more and more in evidence through the efforts of interface designers. Such links are more than just solutions to problems pertaining to the human-computer interface; they provide a fundamental change in our attitude to the relationship between sound, event and action. Curiously, despite the abandonment of traditional instrumentation, the bodily aspect of music-making may be rediscovered through playing such virtual instruments.

The impact of such technologies on music-making within society is yet to be assessed. Nonetheless, their critical potential, arising from the adoption and transformation of audio technology from a merely reproductive concern to a creative one, should not be ignored. Through the development of such technologies it becomes apparent that acousmatic music is not merely a music written "pour l'écoute et par l'écoute" (Delalande, 1986, p. 158) but a music which constantly implies a *critique* of the ever present relationship between listening, events and actions. Indeed, the virtual instrument, although a potential compositional tool for the acousmatic composer, directly contradicts the fixed nature of the acousmatic work through its potential for the live manipulation of sounds through the actions of the musician.

Just as in our interpretations of acousmatic music the links between events and acoustic structures deny the simplistic autonomy of music, so too do the technological developments noted here. Although Barthes (1977b) seems to revel in the dislocation of body and music, he too is aware that the body articulates an important aspect of musical experience. His analysis of

vocal expression (1977c) dwells upon the distinction between the "functionality" of vocal expression and its sensuous relation to its production through the body:

> "The 'grain' is the body in the voice as it sings, the hand as it writes, the limb as it performs. If I perceive the 'grain' in a piece of music and accord this 'grain' a theoretical value (the emergence of the text in the work), I inevitably set up a new scheme of evaluation which will certainly be individual— I am determined to listen to my relation with the body of the man or the woman singing or playing and that relation is erotic— but in no way subjective..."
>
> (Barthes, 1977c, p. 188)

In acousmatic music, such 'grain', whether related to the bodies of listener, performer or composer, seems strangely absent, yet through the interpretative and technological aspects of such music the body is all too evident, whether explicitly, through the perception of a human source for a sound, or implicitly, through the traces of events' everyday affordances. The 'virtual instrument' regains the notion of affordances in musical experience: just like a real instrument it presents the player with affordances, it is strikeable, blowable or bowable. Within such a technological framework the boundaries between player, composer and listener become blurred, especially if, like the home computer and sampler, the 'virtual instrument' becomes widely available. Of course, such availability will be denied to many sectors of society through economic constraints, just as the piano, as an example of instrument technology, was and is beyond the financial means of many members of society.

The virtual instrument provides a critique of technological music which cannot be found within any Luddite approach to musical practice. It provides not a return to some pre-technological music, but a critique of musical practice as it is. It is precisely because such instruments arise from changes within musical practice that they come to have a critical value in relation to that practice. In this sense they can be seen to provide a critique of

attempts by acousmatic music to separate sound from source, information from event and perception from action.

4.3 General conclusions

4.3.1 Perception, description and analysis

This thesis has proposed that acousmatic music will benefit from a perceptual approach to its description, or more precisely that such an approach will be of benefit to developing analytical approaches appropriate to this genre (see Chapter 1). Such an approach was developed through the rejection of the notion that acousmatic music can be described without reference to the environment in which it exists, and the relationship of the listener not only to acousmatic music itself, but this environment as a whole. Through developing from an approach which takes into account the mutual relationship between organism and environment, that of ecological perception, acousmatic music was *described* in terms of the structured information it makes available to the listener, and *analysed* in terms of the interpretative actions one might make within such a perceptual context. The major conclusion to be drawn from this is that by describing acousmatic music as structured information, and assessing the interpretative consequences of such descriptions, an analytical approach develops which emphasises the nature of the acousmatic work not as an intrinsically structured, self-referential 'object', but as a focus for interpretative actions in relation to the interplay between the real environment and the virtual environment of the piece. Moreover, such an approach reveals the fundamentally contingent nature of structure in acousmatic music.

As seen in this chapter, acousmatic music, viewed in relationship to the environment, may be described as being *critical*. Such a critical aspect is shown not only to be in evidence in the production of acousmatic works, but

in their interpretation. Through taking a dialectical approach to the relationship between mimesis and rationality, the acousmatic work can be seen to take on a radical position in its relationship with technology and society. The autonomy of the acousmatic work is shown not only to be relevant to the composer, but to the listener, who is placed within a context in which a direct relationship with the everyday environment is simultaneously drawn upon yet contradicted. Through basing analyses upon the informational structures available to the listener, a description not only of the intrinsic, but also of the extrinsic aspects of the acousmatic work, an aesthetic emerges which revitalises the mimetic aspect of musical experience, but not at the expense of the interpretative.

Through these means it has been demonstrated that finding a 'language' within which to describe, analyse and evaluate acousmatic music need not founder upon the difficulties normally associated with the genre. Analytical pertinence is not seen as an absolute, but as a contingent notion, relative to the various kinds of information available to the analyst. In contrast to attempts to constrain the acousmatic work within a traditional theoretical and notational framework, bound up with a largely functional approach to musical structure and related prescriptive ideologies, a 'language' of description has been used which is derived from everyday listening. Far from being inimical to musical issues, such an approach helps locate acousmatic music within experience without denying its peculiar status within that experience. Through this, it is hoped, the difference between analysing music in order to find out how it is made, and analysing music in order to discover how it might be interpreted may be found. Similarly, correspondences between, but not validations of, functional and perceptual approaches to acousmatic music may be discovered. Such correspondences enable a dialogue between compositional and interpretative concerns which is

impossible if the latter is reduced to the perception of those aspects deemed important by the former.

4.3.2 Perceptual research and musical research

In direct contrast to empirical studies of musical perception, the approach taken here has avoided any attempt to propose and test hypotheses within the framework of the scientific method. Similarly, in contrast to most music-theoretical research which draws upon such empirical work (e.g. Lerdahl, 1988), no attempt has been made to validate aesthetic or theoretical claims with 'hard' scientific evidence. Nonetheless, much of the research in auditory perception cited, and the theory of perception utilised in formulating the analytical approach taken is based upon psychological theory, whether empirically validated or not. Since the reasoning behind this approach has relevance not only to the study of acousmatic music (see Chapter 2) but to the relationship between psychology and music in general, this decision should be examined in more detail.

It has been suggested that music and psychology have a mutual relationship, that just as music may provide insights into the workings of the mind, so may psychology provide insights into the workings of music (see e.g. McAdams, 1987). McAdams argues that the study of music and the study of psychological processes have a close historical relationship, and that the prevailing view of music psychology, one in which the mental representation of intrinsic musical structures predominates, can be seen to not only reflect the success of cognitive approaches to musical perception, but also to arise from music's own predominantly structural nature. However, such a mutually *validating* approach to research is hugely problematic. The assumptions made by music psychology about the nature of music are not free from ideological bias. The view of music as a predominantly structural domain, in which other factors may play a role but may be conveniently disregarded for empirical

purposes, is not one supported by either compositional or perceptual issues in acousmatic music, for example. As discussed in Chapter 1 of this thesis, many empirical studies of timbre implicitly or explicitly accept the assumption that timbre should be studied in the same way as pitch or rhythm, as a discrete parameter. It is not suggested that listeners cannot or do not hear timbre in this way, nor is it suggested that composers may not wish to embrace the application of such research in their work. However, as shown through the discussion of ecological acoustics in Chapter 2, this is a peculiarly biased view of timbre. Moreover, this bias is not just towards musical timbre as opposed to everyday timbre, but a view of timbre biased upon a highly traditional exclusion of the extrinsic aspects of music.

Such prejudices are not inevitable, and this thesis is one attempt to show how the study of perception and the study of music may come to have a relationship which is not an attempt to validate or falsify *existing* assumptions about music, nor an attempt to construct a theory of music which complies with such empirical work. Empirical work requires hypotheses, and hypotheses are generated by our theories about the world, in this case the musical world. Empirical work on timbre has thus far only tested hypotheses generated by an impoverished view of timbre, one which is contradicted by the ways in which timbres are conceived of by many composers, and the ways in which they may be perceived. This thesis is thus as much an attempt to address the issues that might be relevant to future empirical work in the area of music perception, as it is an attempt to show how current approaches are inadequate to the issues raised by acousmatic music, in that it attempts to criticise the ideologies that relegate extrinsic or mimetic aspects of music to a supplementary role in musical experience.

In itself, however, this thesis is not primarily concerned with a scientific approach to music. If it is concerned with science at all it is in the *dialogue* which might emerge between science and music. Rather than an

attempt to find "objective truth" such an approach is one in which "keeping the conversation going" between different discourses is the primary goal (Rorty, 1980, p. 377). By bringing together the different discourses of ecological perception and music theory in relation to a particular music-analytical problem a dialogue is produced which avoids the temptation to find one all-inclusive discourse which validates all others, a tacit assumption of the notion that the study of music perception might be carried out according to a paradigm which attempts to explain the "psychology of music" in its entirety (McAdams, 1987). The pragmatic result of seeking "truth" through a single discourse in such circumstances is to deny the legitimacy of contrasting discourses and run the risk of the kinds of tacit and inappropriate assumptions which one discourse invariably makes regarding another, such as a mistaken view that music is an essentially intrinsic form. In this way the legitimacy of music, or the discourse that surrounds it, can be brought into disrepute by the need to legitimate it through, for example, appeals to "psychologically real" artefacts (cf. Lerdahl, 1988) which may not correspond to the kinds of artefacts identified through contrasting discourses. Although McAdams (1987) does propose that music and psychology regard each other with a "mutual regard", such mutuality is specious unless one takes care not merely to accept the dominant musical ideology for reality.

In response to this, the perceptual, analytical and critical components of this thesis are not reduced to one discourse, but shown for what they are: different views of the same phenomena. Discourses may be appropriate or inappropriate to particular circumstances, as ecological approaches and the methods of Adorno might be for acousmatic music, but they stand or fall in their own terms, not through their mutual validation. 'Translation' is here the vital concept, not validation, and it is hoped that the dialogue attempted here reveals an alternative to conventional perspectives on the relationship between perception, interpretation and aesthetics. Proving that sounds provide

structured information and showing that such a perspective may produce enlightening analyses of musical works or an insight into their aesthetic nature are quite different things, and should not be confused. The ecological approach to perception is valuable in this case because it enables a critical dialogue to occur between musical practice and interpretation which has been conspicuously absent in writings on acousmatic music. Moreover, the dialogue between this approach to perception and conspicuously musical issues gains its value in the *difficulties* of reconciling such musical and hence aesthetic issues with the everyday concerns so close to the heart of the ecological approach to perception. This thesis proposes that acousmatic music cannot be *reduced* to everyday perception, but nonetheless benefits from coming into a dialogue with such concerns. Mimesis and rationality may be *translated* into the discourse of ecological perception, but cannot be *reduced* to such a discourse. The dialogue between ecological perception and music analysis is here left for what it is, a pragmatic attempt to find an enlightening translation between the discourses of perceptual science, musical analysis and aesthetics.

4.3.3 Theory and practice in acousmatic music

Lastly, some conclusions may be reached regarding the relationship between the theory and practice of acousmatic music. Although perception and description, rather than any prescriptive or functional bias, have been concentrated upon, the aesthetic conclusions reached in this chapter have at least introduced the notion of a correspondence between compositional and listening concerns. The inclusive nature of the acousmatic work has been shown to be of concern to both listener and composer through the challenges it presents as to music as an autonomous art-form. This potential common ground may have some implications for both the theory and practice of acousmatic music. Both theory and practice may attempt to avoid any

consideration of the listener. However, once theory attempts to consider perception, it becomes difficult to maintain such a monadic view, especially where listener and composer may be seen to share some common ground. In this situation one is led to ask: should practice reflect the concerns of the listener?

Theories both arise from practice, and constrain practice. Schaeffer's approach to the acousmatic (Schaeffer, 1966) was to base his theoretical work on the experiences of "reduced listening" so appropriate to the changes in quality engendered by listening to a repeating record or tape-loop. The practice of composing with such means led to a theoretical construct which prioritised the disembodied nature of these sounds. Are such means appropriate after consideration of the contingency of interpretation identified here? In one sense, to criticise Schaeffer's theory would be quite wrong: it was matched to a particular practice of composition. However, such theories can take on a mythic status, quite separate from their original practical context. By considering listening from a context quite separate from that of composition it is possible to separate theory temporarily from musical practice itself, and hence to provide an alternate view of musical practice, side-stepping the dominance of functional aspects of theory. It is not suggested that such a process should alter our views on a particular approach to composition, but it has offered a theory which could temper certain compositional concerns with the knowledge that listener and composer do inhabit a largely similar environment. Exploiting this shared context through the exploitation of sound as information for events, perhaps through the exploitation of invariant acoustic structures, might provide a valuable supplement to the prevailingly abstract view of sound as pure timbre. Listening itself is the practice which has been constrained by music theory for too long, whether linked to musical practices or merely imposed upon them. Music need not be a wholly intrinsic, contentless form, and if this approach to acousmatic music has achieved

anything, it is that it has shown how rich the content of acousmatic music may be, regardless of the practical and theoretical efforts that have been made to extinguish such content. In contrast, however, it has been shown that such content does not reduce acousmatic music to an impoverished record or simulacrum of the environment. An acousmatic piece is neither autonomous, nor mimetic, but exists in the dialectic between these two forces, and ignoring either side of this dialectic fails to do justice to its aesthetic potential.

References

Adorno, T. W. (1973). *Philosophy of Modern Music* (trans. A. G. Mitchell and W. V. Blomster). London, Sheed and Ward.

Adorno, T. W. (1977a). Music and the New Music: In Memory of Peter Suhrkamp. *Telos*, **32**, pp. 124-138.

Adorno, T. W. (1977b). Music and Technique. *Telos*, **32**, pp. 79-94.

Adorno, T. W. (1981/2). Transparencies on Film. *New German Critique*, **24/25**, pp. 199-205.

Adorno, T. W. (1984). *Aesthetic Theory*. (trans. C. Lenhardt). London, Routledge and Kegan Paul.

Adorno, T. W. (1988). The Aging of the New Music. *Telos*, **77**, pp. 95-116.

Adorno, T. W. (1990a). The Curves of the Needle. *October*, **55**, pp. 49-55.

Adorno, T. W. (1990b). The Form of the Phonograph Record. *October*, **55**, pp. 56-61.

Adorno, T. W. (1990c). Opera and the Long-Playing Record. *October*, **55**, pp. 62-66.

Agawu, V. K. (1991). *Playing with Signs: A Semiotic Interpretation of Classic Music*. Princeton University Press, N. J., Princeton University Press.

Balzano, G. J. (1980). The group-theoretic description of 12-fold and microtonal pitch systems. *Computer Music Journal*, 1980, **4** (4), pp. 66-84

Balzano, G. J. (1982).The pitch set as a level of description for studying musical pitch perception. In M Clynes (ed.) *Music, mind and brain: the neuropsychology of music*. New York, Plenum.

Balzano, G. J. (1986). Music perception as detection of pitch-time constraints. In V. McCabe and G. J. Balzano (eds.) *Event Cognition: an ecological perspective*. Lawrence Erlbaum.

Barthes, R. (1977a) The Death of the Author. In Heath, S. (Ed. and trans.) *Image-Music-Text*. London, Fontana.

Barthes, R. (1977b) Musica Practica. In Heath, S. (Ed. and trans.) *Image-Music-Text*. London, Fontana.

Barthes, R. (1977c) The Grain of the Voice. In Heath, S. (Ed. and trans.) *Image-Music-Text*. London, Fontana.

Bregman, A. S. (1990). *Auditory Scene Analysis: The Perceptual Organisation of Sound*. Cambridge, MIT press.

Cadoz, C., Florens, J. -L. and Luciani, A. (1984). Responsive input devices and sound synthesis by simulation of instrumental mechanisms: the CORDIS system. *Computer Music Journal*, **8** (3), pp. 60-73.

Cadoz, C., Lisowski, L. and Florens, J. -L. (1990). A Modular feedback keyboard design. *Computer Music Journal*, **14** (2), pp. 47-51.

Chion, M. (1983). *Guide des objets sonores*. Paris, Buchet/Chastel.

Chion, M. (1993). The State of Musique Concrète. *Contemporary Music Review*, **8** (1), pp. 51-55.

Chomsky, N. (1957). *Syntactic Structures*. The Hague, Mouton.

Clarke, E. F. (1988). Generative principles in music performance. In J. Sloboda (Ed.) *Generative Processes in Music*, OUP.

Clarke, E. F. (1989). Issues in language and music. *Contemporary Music Review*, **4**, pp. 9-22.

Clarke, E. F. (1993). Generativity, mimesis and human body in music performance. *Contemporary Music Review*, **9**, pp. 207-219.

Clynes, M. (1977). *Sentics, the Touch of Emotions*. New York, Anchor.

Cogan, R. (1984). *New Images of Musical Sound*. Cambridge, MIT Press.

Costall , A. & Still, A. (1989). Gibson's Theory of Direct Perception and the Problem of Cultural Relativism. *Journal for the Theory of Social Behaviour*, **19** (4), pp. 433-441.

Costall, A. (1989). A closer look at direct perception. In A. Gellatly, D. Rogers and J. A. Sloboda (eds.) *Cognition and Social Worlds*. Oxford, Clarendon Press, pp. 10-21.

Davidson, J. W. (1993). Visual Perception of Performance Manner in the Movements of Solo Musicians. *Psychology of Music*, **21** (2), pp. 103-113.

Delalande, F. (1986). Pertinence et analyses perceptives. *La Revue Musicale.* **394-397**, pp. 158-173.

Eco, U. (1979). *A Theory of Semiotics*. Bloomington, Indiana University Press.

Eisenberg, E. (1987). *The Recording Angel.* London, Pan Books.

Emmerson, S. (1986). The Relation of Language to Materials. In S. Emmerson (ed.)*The Language of Electroacoustic Music.* London, Macmillan.

Freed, D.J. (1990). Auditory correlates of perceived mallet hardness for a set of recorded percussive sound events. *Journal of the Acoustical Society of America*, **87**, pp. 311-322.

Gaver , W. W. (1992). What in the world do we hear? How do we hear in the world? Paper presented at the *Second European Conference on Ecological Psychology,* University of Strathclyde, Glasgow.

Gaver, W. W. (1993). What in the world do we hear? An ecological approach to auditory event perception. *Ecological Psychology*, **5** (1), pp. 1-29.

Gibson, J. J. (1966) *The Senses considered as Perceptual Systems*. London, Unwin Bros.

Gibson, J. J. (1979). *The Ecological Approach to Visual Perception*. New Jersey, Lawrence Erlbaum.

Grey, J. M. (1977) Multidimensional perceptual scaling of musical timbres. *Journal of the Acoustical Society of America*. **61** (5), pp. 1270-1277.

Grey, J. M. and Gordon, J. W. (1978). Perceptual effects of spectral modifications on musical timbres. *Journal of the Acoustical Society of America*. **63** (5), pp. 1493-1500.

Hanslick, E. (1974). *The Beautiful in Music: A Contribution to the Revisal of Musical Aesthetics* (trans. G. Cohen). New York, Da Capo Press.

Heine, W-D and Guski, R. (1991). Listening: The Perception of Auditory Events? An Essay Review of *Listening: An Introduction to the Perception of Auditory Events.* by Stephen Handel. *Ecological Psychology*, **3** (3), pp. 263-275.

Helmholtz, H. (1954). *On the Sensations of Tone* (trans. A. Ellis) N. Y., Dover.

Horkheimer, M. & Adorno, T. W. (1973). *Dialectic of Enlightenment*. London, Allen Lane.

Howard, J. H. and Ballas J. A. (1980). Syntactic and semantic factors in the classification of nonspeech transient patterns. *Perception and Psychophysics*, **28**, pp. 431-439.

Howard, J. H. and Ballas J. A. (1982). Acquisition of Acoustic Pattern Categories by Exemplar Observation. *Organisational Behaviour and Human Performance*, **30**, pp. 157-173.

Howard, J. H. and Ballas, J. A. (1983). Perception of simulated propeller cavitation. *Human Factors*. **25** (6), pp. 643-655.

Howard, J. H. and Silverman, E. B. (1976). A multidimensional scaling analysis of 16 complex sounds. *Perception and Psychophysics*. **19** (2), pp. 193-200.

Jenkins, J. J. (1984). Acoustic information for places, objects and events. In Warren, W. H. and Shaw, R. E. (Eds.), *Persistence and change: Proceedings of the first international conference on event perception.* N. J., Erlbaum.

Kant, I. (1952) *The critique of judgement* (trans. James Creed Meredith). Oxford, Clarendon Press.

Keane, D. (1986). At the Threshold of an Aesthetic. In S. Emmerson (ed.) *The Language of Electroacoustic Music*. London, Macmillan.

Kendall, G. S. (1991). Visualisation by Ear. Auditory Imagery for Scientific Visualisation and Virtual Reality. *Computer Music Journal*, **15** (4), pp. 70-73.

Kendall, R. A. and Carterette, E. C. (1991). Perceptual scaling of simultaneous wind instrument timbres. Music Perception, **8** (4), 369-404.

Kistler, D. J. and Wightman, F. L. (1992). A model of head-related transfer functions based on principal components analysis and minimum-phase reconstruction. *Journal of the Acoustical Society of America*., **91** (3), pp. 1637-1647.

Krumhansl C. L. (1983). Perceptual structures for tonal music. *Music Perception*. **1** (1), pp.28-63

Kugler, P. N., Shaw, R. E., Vincente, K. J. and Kinsella-Shaw, J. (1990). Inquiry into intentional systems I: Issues in ecological physics. *Psychological Research*, **52**, pp. 98-121.

Langer, S. K. (1953). *Feeling and Form*. London, Routledge and Kegan Paul.

Langer, S. K. (1957). *Philosophy in a New Key*. Cambridge, Harvard University Press.

Lerdahl, F. (1987). Timbral Hierarchies. *Contemporary Music Review*, **2** (1), pp. 135-160.

Lerdahl, F. (1988). Cognitive constraints on compositional systems. In J. Sloboda (Ed.) *Generative Processes in Music*, OUP.

Lerdahl, F. and Jackendoff, R. (1983). *A Generative Theory of Tonal Music*, Cambridge, MIT press.

Levi-Strauss, C. (1969). *The Raw and the Cooked*. New York, Harper and Row.

Levin, T. Y. (1990). For the Record: Adorno on Music in the Age of Its Technological Reproducibility. *October*, **55**, pp. 23-47.

Lidov, D. (1987). Mind and body in music. *Semiotica*, **66** (1/3), pp. 69-97.

Ligeti, G. and Wehinger, R, (1970). *Artikulation. An Aural Score by Rainer Wehinger*. Mainz, Schott.

Mark, L. S., Todd, J. T. and Shaw, R. E. (1981). Perception of Growth: A Geometric Analysis of How Different Styles of Change Are Distinguished. *Journal of Experimental Psychology: Human Perception and Performance*. **7** (4), pp. 855-868.

McAdams, S. (1987). Music: A science of the mind. *Contemporary Music Review*, **2** (1), pp. 1-61.

McAdams S. and Cunibile, J-C. (1992). Perception of Timbral Analogies. *Philosophical Transactions of the Royal Society*, Series B, **336**, pp. 383-389.

McAdams, S. (1984). The auditory image: A metaphor for musical and psychological research on auditory organisation. In W. R. Crozier and A. J. Chapman (eds.) *Cognitive Processes in the Perception of Art*, North-Holland.

McAdams, S. (1993).Recognition of Sound Sources and Events. In S. McAdams and E. Bigand (Eds.) *Thinking in Sound: The Cognitive Psychology of Human Audition*. Clarendon Press, Oxford, pp. 146-198.

McAdams, S. (1994). Big sister Pitch's little brother Timbre comes of Age. Keynote address delivered at the 3rd International Conference for Music Perception and Cognition. Summarised in the *Proceedings of the 3rd I. C. M. P. C*, University of Liège, pp. 33-34.

McAdams, S. and Bregman, A. S. (1979): "Hearing Musical Streams", *Computer Music Journal*, **3** (4), pp. 26-60

Mead, G. H. (1934). *Mind, Self and Society*. University of Chicago Press.

Meyer, L. B. (1967). *Music, the Arts and Ideas*. University of Chicago Press.

Meyer, L. B. (1973): *Explaining Music: Esays and Explorations*. University of California Press.

Monelle, R. (1992). *Linguistics and Semiotics in Music*. Harwood Academic Publishers.

Narmour, E, (1977). *Beyond Schenkerism: The Need for Alternatives in Music Analysis*. Chicago University Press.

Nattiez, J.-J. (Trans, Abbate, C.) (1990). *Music and Discourse. Toward a Semiology of Music*. Princeton University Press.

Nattiez, J.-J. (Trans. Barry, A.) (1982). Varèse's Density 21.5: a study in semiological analysis. *Music Analysis*, **1** (3), 243-340.

Noble, W. G. (1981). Gibsonian Theory and the Pragmatist Perspective. *Journal of the Theory of Social Behaviour*. **11** (1), pp. 65-85.

Norman, K. (1994) Telling Tales. In S. Emmerson (ed.) *Timbre Composition in Electroacoustic Music*, Contemporary Music Review, **10** (2), pp. 103-109.

Paddison, M. (1991). The Language Character of Music: Some Motifs in Adorno. *Journal of the Royal Musical Association*, **116** (2), pp. 267-279.

Peirce, C. S. (1991). *Peirce on Signs* (ed. J. Hoopes). Chapel Hill, University of North Carolina Press.

Reed, E. (1991). James Gibson's ecological approach to cognition. In A. Still and A. Costall (eds.) *Against Cognitivism: Alternative Foundations for a Cognitive Psychology*. London, Harvester Wheatsheaf.

Repp, B. H. (1987). The sound of two hands clapping. *Journal of the Acoustical Society of America*, **81**, pp. 1100-9.

Risset, J. C. (1969). Pitch Control and Pitch Paradoxes Demonstrated with Computer-Synthesised Sounds. *Journal of the Acoustical Society of America*, **46** (1), p. 88.

Rorty, R. (1980). *Philosophy and the Mirror of Nature*. Oxford, Basil Blackwell.

Runeson, S. and Frykholm, G. (1983). Kinematic Specification of Dynamics as an informational basis for person-and-action perception: Expectations, gender, recognition, and deceptive intention. *Journal of Experimental Psychology: General*, **112**, pp. 585-615.

Saussure, F. de (1983). *Course in General Linguistics* (Trans. R. Harris). London, Duckworth.

Schaeffer, P. (1966). *Traité des objets musicaux*. Paris, Seuil.

Schoenberg, A. (1973). *Theory of Harmony*. (trans. R. E. Carter). London, Faber and Faber.

Scruton, R. (1983). *The Aesthetic Understanding*. London, Methuen.

Shaw, B. K., McGowan, R. S. and Turvey, M. T. (1991). An Acoustic Variable Specifying Time to Contact. *Ecological Psychology*, **3** (3), pp. 253-261.

Shaw, R. and Turvey, M. T. (1981). Coalitions as models for ecosystems: A realist perspective on perceptual organization. In Kubovy, M. and Pomerantz, J. R. (Eds.), *Perceptual Organisation*. Hillsdale, N. J., Erlbaum.

Shaw, R. E., McIntyre, M. and Mace, W. (1974). The Role of Symmetry in Event Perception. In Macleod, R. S. and Pick, H. L. *Perception: Essays in Honour of James Gibson*. Ithaca, Cornell University Press.

Shepard, R. (1982). Geometrical approximations to the structure of musical pitch. *Psychological Review*. **89**, pp. 305-333

Slawson, W. (1985). *Sound Color*. Los Angeles, University of California Press.

Smalley, D. (1986). Spectro-morphology and Structuring Processes. In S. Emmerson (ed.) *The Language of Electroacoustic Music*. London, Macmillan.

Smalley, D. (1992). The Listening Imagination: Listening in the Electroacoustic Era. In T. Howell, R. Orton & P. Seymour (Eds.) *Companion to Contemporary Musical Thought*, Vol. 1. Routledge.

Smalley, D. (1994). Defining Timbre - Refining Timbre. In S. Emmerson (ed.) *Timbre Composition in Electroacoustic Music*, Contemporary Music Review, **10** (2), pp. 35-48.

Smoliar, S. (1993). Classifying everyday sounds in video annotation. In T.-S. Chua and T. L. Kunii (eds.) *Proceedings of the First International Conference on Multimedia Modelling*. Singapore, World Scientific. Volume 1, pp. 309-313

Solomon, L. N. (1958). Semantic approach to the perception of complex sounds. *Journal of the Acoustical Society of America*. **30** (3), pp. 421-425.

Solomon, L. N. (1959a). Search for physical correlates to psychological dimensions of sounds. *Journal of the Acoustical Society of America*. **31** (4), pp. 492-497.

Solomon, L. N. (1959b). Semantic reactions to systematically varied sounds. *Journal of the Acoustical Society of America*. **31** (7), pp. 986-990.

Spelke, E. S. (1976). Infants' Intermodal Perception of Events. *Cognitive Psychology,* **8**, pp. 553-560.

Spelke, E. S. (1979). Perceiving Bimodally Specified Events in Infancy. *Developmental Psychology*, **15** (6), pp. 626-636.

Ten Hoopen, C. (1994). Issues in Timbre and Perception. In S. Emmerson (ed.) *Timbre Composition in Electroacoustic Music*, Contemporary Music Review, **10** (2), pp. 61-109.

Todd, N. P., Clarke, E. F. and Davidson, J. W. (1993). The Representation of Self-Motion in Expressive Performance. Paper presented at the Annual Conference of the Society of Music Perception and Cognition, University of Pennsylvania.

Truax, B. (1984). *Acoustic Communication*. New Jersey, Ablex.

Vanderveer, N. J. (1979). *Ecological Acoustics. Human perception of environmental sounds*. Doctoral Thesis, Dissertation Abstracts International, 40/09B, 4543. (University Microfilms No. 8004002).

Warren, W. H. and Shaw, R. E. (1985). Events and Encounters as Units of Analysis for Ecological Psychogy. In Warren, W. H. and Shaw, R. E. (eds.) *Persistence and Change: Proceedings of the First International Conference On Event Perception*. New Jersey, Lawrence Erlbaum.

Warren, W. H. and Verbrugge, R. R. (1984) Auditory Perception of Breaking and Bouncing Events: A Case Study in Ecological Acoustics. *Journal of Experimental Psychology: Human Perception and Performance*, **10** (5), pp. 704-712.

Warren, W. H., Kim, E. K. and Husney, R. (1987). The way the ball bounces: visual and auditory perception of elasticity and the bounce pass. *Perception*, **16**, pp. 309-336.

Wessel, D. J. (1979). Timbre space as a musical control structure. *Computer Music Journal*, **3**, pp. 45-52.

Windsor, W. L. (1994) Ecological constraints and the perceived structure of electroacoustic music. *Proceedings of the 3rd International Congress on Music Perception and Cognition*. University of Liège, pp. 305-306

Wishart, T. (1978). *Red Bird*. York, T. Wishart.

Wishart, T. (1985). *On Sonic Art*. York, Imagineering Press.

Wishart, T. (1986). Sound Symbols and Landscapes. In S. Emmerson (ed.) *The Language of Electroacoustic Music*. London, Macmillan.

Wishart, T. (1992). Sleeve notes to CD version of *Red Bird*. October Music, Oct 001, Realspace Musics/Alfred A. Kalmus.

Related publications by the author

Using Auditory Information for Events in Electroacoustic Music. In S. Emmerson (ed.) Timbre Composition in Electroacoustic Music, *Contemporary Music Review*, **10** (2) pp. 85-93 (1994).

Perception and Signification in Electroacoustic Music. In R. Monelle and C. T. Gray (eds.) *Song and Signification*, Edinburgh University Faculty of Music (in press).

Autonomy, Mimesis and Mechanical Reproduction in Contemporary Music. In K. Norman (ed.) A Poetry of Reality: Sampling the real world, *Contemporary Music Review* (in press).

Recordings cited

Alvarez, J. Mambo a la Braque. On *Electroclips*, Diffusion i Média: IMED-9004-CD

Bayle, F. *Grande Polyphonie*. INA/GRM: AM 727.04

Daoust, Y. Mi Bémol. On *Electroclips*, Diffusion i Média: IMED-9004-CD

Frith, F. *Guitar Solos*. RecRec Music: RecDec 904

Henry, P. *Variations pour une porte et un soupir*. Harmonia Mundi: HMC 905200

Ligeti, G. *Artikulation*. Wergo: WER 60161-50

Risset, J-C. *Computer Suite from Little Boy*. Wergo: WER 2013-50

Smalley, D. *Wind Chimes*. Wergo: WER 2025-2

Stockhausen, K. *Kontakte*. Wergo: WER 6009-2

Wishart, T. *Red Bird*. October Music: OCT 001

Zorn. J. (Naked City). *Torture Garden*. Earache Records: MOSH 28